





























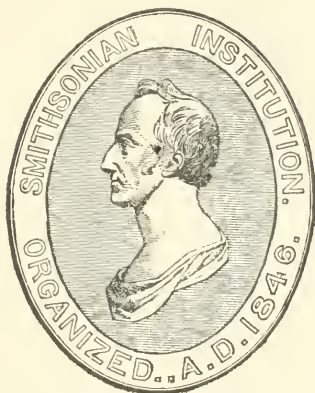


SMITHSONIAN  
MISCELLANEOUS COLLECTIONS.

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VOL. XXII.

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"EVERY MAN IS A VALUABLE MEMBER OF SOCIETY WHO BY HIS OBSERVATIONS, RESEARCHES,  
AND EXPERIMENTS PROCURES KNOWLEDGE FOR MEN."—SMITHSON.

*C. C. Smith*  
E. C. SMITH

WASHINGTON:  
PUBLISHED BY THE SMITHSONIAN INSTITUTION.  
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Department of the Interior:

U. S. NATIONAL MUSEUM.

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P R O C E E D I N G S  
OF THE  
UNITED STATES NATIONAL MUSEUM.  
1880.

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REVISIONS OF NOMENCLATURE OF CERTAIN NORTH AMERICAN  
BIRDS.

By ROBERT RIDGWAY.

The following emendations of nomenclature apply both to species enumerated in the latest published list of North American birds—Cones's "Check List,"\* and others not contained therein. These two series are therefore included in separate categories, the former having, for convenience of reference, the corresponding number of the "Check List" prefixed to each name.

It is deemed inexpedient to give here a list of the species to be added to the Smithsonian Catalogue of 1859,† for the reason that they are sufficiently distinguished by the absence of the concordant number following each name, in the revised list following this paper.

a. SPECIES GIVEN IN COUES'S CHECK LIST.

4b. *Turdus* AONALASCHKAE, ‡ Gmel.—In my report on the ornithology of the fortieth parallel expedition I used the name "*guttata*, Pallas," as the earliest name certainly applicable to this species; but I now believe that Gmelin's name, *Turdus aonalaschkae*, based upon the *Unalascha Thrush* of Pennant (Arctic Zoology, II, p. 338) and *Aoonalashka Thrush* of Latham (Synopsis, II, i, p. 23), is the one which should be used. As in the case of *Muscicapa guttata*, Pall., there can be no doubt whatever that the western Dwarf Thrush (*Turdus nanus*, Auct., *nee* Aud.!) is the very species which these authors described under the above names. *Turdus aonalaschkae* being, therefore, the proper name for the Hermit Thrushes collectively, the Middle and Eastern Province forms should be called, respectively, *T. aonalaschkae auduboni* and *T. aonalaschkae pallasii*. With regard to the last, it is very evident that

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\* A Check List of North American Birds. By Elliot Cones. Salem. Naturalists' Agency. 1873. 8vo, pp. 137. (635 species.)

† Catalogue of North American Birds contained chiefly in the Museum of the Smithsonian Institution. By Spencer F. Baird. [First octavo edition.] Washington: Smithsonian Institution. 1859. ["Smithsonian Miscellaneous Collections, 108." Not paged; 738 species, including varieties, all consecutively numbered.]

‡ Small capitals indicate the name which is changed or emended.

*Turdus nanus*, Aud., was based upon a small specimen of the eastern Hermit Thrush, since Audubon distinctly says so in his account of the supposed species. The name *nanus* antedates *pallasi*; but the latter having been used, in a restricted sense, exclusively for the eastern race, while *nanus* has been almost wholly applied, of late years, to the small west-coast form now to be called *T. aonalaschkae*, it seems best to discard the name *nanus* altogether and adopt for the eastern birds that of *pallasi*, as next in order of date.

61. *HELONÆA swainsoni*, Aud.—According to Agassiz, the correct orthography of the generic name of this species (if to be separated from *Helmitherus*) is *Helonæa* and not "*Helinaia*," as spelled by Audubon. (Cf. Newton, P. Z. S., 1879, p. 552.)

144a. *Leucosticte griseinucha* (Brandt) Bp.—The present indications are that this form does not intergrade with *L. tephrocotis*, but, on the contrary, is a well-defined species of very constant characters confined strictly to that portion of the Alaskan coast west of the one hundred and thirty-fifth degree of west longitude.

146a. *Ægiothus linaria*, "var. *fuscescens*."—No examples referable to the so-called *fuscescens* having ever been taken in winter; while the particular stage originally so named is represented by birds in highly intensified midsummer dress from various portions of subarctic America (the interior of the continent and coast of Alaska, as well as Labrador), the inference is natural that "*fuscescens*" represents simply the midsummer plumage of the common species. (Cf. Cones, Birds of the Northwest, 1874, p. 115.)

146b. *Ægiothus CANESCENS cxilipes* (Cones) Ridgw.—There is every probability that *Æ. canescens* is a quite distinct species, since it occurs in almost every district inhabited by *Æ. linaria* (especially in the Neartic Region), and cannot therefore be a geographical race of the same species. *Æ. canescens* and *Æ. linaria holböllii* are the large boreal races breeding in Greenland; *Æ. canescens cxilipes* and *Æ. linaria* proper are the smaller continental forms.

159a. *Passerculus ANTHINUS*, Bp.—This seems to be quite distinct from *P. sandwichensis*, and probably more nearly related to—

160a. *Passerculus GUTTATUS*, Lawr., which proves to be very distinct from *P. rostratus*.

165 a (Appendix). *Anmodromus nigrescens*, Ridgw.—As has already been insisted by Mr. Maynard (see Am. Sportsman, V. Jan. 16, 1875, p. 248), this bird is very probably distinct specifically from *A. maritimus*.

169. *Melospiza FASCIATA* (Gm.) Scott.—We can see no valid reason why Gmelin's name for this species should not be used instead of Wilson's, bestowed upon it nearly a quarter of a century later. (Cf. Scott,

Am. Nat., 1876, p. 17.) The recognizable forms of this species should therefore be known as (169*a*) *M. FASCIATA fallax*, (169*b*) *M. FASCIATA guttata*, (169*e*) *M. FASCIATA rufina*, (169*d*) *M. FASCIATA heermanni*, and (169*e*) *M. FASCIATA SAMUELIS* (*samuelis* antedating *gouldii*). †

169*f*. *Melospiza CINEREA* (Gm.) Ridgw.—Through the explorations of Messrs. Dall, Turner, and Nelson, the fauna of Unalashka has of late years been very thoroughly investigated, and we are thus able to identify the "Cinereous Finch" of Pennant (Aret. Zoology, II, p. 68) upon which Gmelin based his *Fringilla cinerea* (S. N., I, ii, p. 922) with the species which Professor Baird afterward named *Melospiza insignis* (Trans. Chicago Acad., I, i, p. 319, pl. 29, fig. 2). Through the same means it becomes equally certain that the *Oonalaska Bunting* of Pennant and Latham (*Emberiza unalascensis*, Gm., S. N., I, ii, p. 875) is, as some authors have long maintained, the bird usually called *Passerella townsendi* (Aud.). The known forms of *Passerella* having been proven by Mr. Henshaw to intergrade, and therefore, to constitute mere geographical races of a single species, they should be known by the following names:—

188. *P. iliaca* (Merrem) Sw.

“189”*a*. *P. ILIACA UNALASCHENSIS* (Gm.) Ridgw.

189*a*. *P. ILIACA schistacea* (Baird) Hensh.

— *P. ILIACA megarhyncha* (Baird) Hensh.—

the latter—connecting *unalascensis* with *schistacea*, but peculiar in the extremely robust bill and other characters—not being given in the “Check List.”

170*a* (Appendix). *Peuceea arizonae*. Ridgw.—There is very strong probability of this being quite distinct, specifically, from *P. æstivalis*. (See Proc. U. S. Nat. Mus., 1. 1878, p. 127, foot-note.)

177. *Spizella MONTANA* (Forst.) Ridgw.—Forster's name of *montana* applied to this species in 1772 antedates Gmelin's name *monticola* (1788), and, there being no objection to it otherwise, should be substituted for it.

180*a*. *Spizella BREWERI*, Cass.—Thus far there appears not the slightest evidence that this bird should be referred to *S. pallida*. The respective habitats of the two overlap quite considerably, and they may always be easily distinguished by the markings of the head.

191. *SPIZA americana* (Gm.) Bp.—In 1858 Professor Baird rejected the generic name *Spiza* for this species, for the reason that, although it “was first used in connection with *Emberiza americana*,” it was “so mixed up with types of several other modern genera as to render it uncertain whether to apply it to one rather than to another”—at the same time remarking that “if *Spiza* pointed more unmistakably to the *E. americana* it might, perhaps, be necessary to adopt it.” (“Birds N. Am.,” p. 494.) Upon referring to the “Specchio Comparativo,” where Bonaparte next, after its institution, mentions his genus *Spiza*, I find, in the



foot-note on p. 47, that he distinctly names *E. americana* as the type of the genus ("Reconoscemmo inoltre, che quest' uccello [*E. melanocephala*] è il perfetto analogo della *Fringilla americana* TIPO DI QUEL SOTTOGENRE"). Four years later, however, Bonaparte proposed the name *Euspiza* for the same type ("Saggio," p. 141), but according to recognized rules this later name becomes simply a synonym of *Spiza*, as does also Cabanis's name *Euspina*, the latter substituted for *Euspiza* (Mus. Hein., I, p. 133), under the misapprehension that the type of the latter was the *Emberiza melanocephala* of Scopoli (see M. H., p. 130)—a species not only generically distinct from *E. americana*, Gmel., but moreover hardly a member of the same subfamily.

201. *Phonipara* ZENA (Linn.) Bryant.—"*Fringilla bicolor*," Linn., S. N., ed. 12 (1766)=*F. zena*, Linn., S. N., ed. 10 (1758).

206. *Pipilo fuscus* MESOLEUCUS (Baird) B. B. & R.—The Arizona form of this species is very easily distinguishable from the true *fuscus* of Mexico, the latter being without the rufous cap of *mesoleucus*, the colors in general darker, etc.

212b. *Agelaius* TRICOLOR (Nutt.) Bp.—Totally distinct from *A. phæniceus*.

223. *Pica* RUSTICA *hudsonica* (Sab.) Baird.—The earliest available name for the European Magpie appears to be *Corvus rusticus*, Scopoli (1769), which considerably antedates "*melanoleuca*, Vieill." (1818), and is now adopted by European authorities. (Cf. Dresser, Birds of Europe, pt. xxii.) The American bird, therefore, if to be separated subspecifically from the European (for which there certainly seems sufficient reason), should be named as above.

229a (Appendix). *Perisoreus obscurus*, Ridgw.—Since the original description of this bird was published Mr. Henshaw has obtained additional specimens, and, by an examination of them, together with the types, has adopted Mr. Sharpe's conclusion (Cat. B. Brit. Mus., III, p. 105) that the form in question is a distinct species, an opinion in which I at present wholly agree. Not so, however, with *capitalis*, Baird, which Mr. Sharpe treats in the same manner; the latter unquestionably grades directly into *P. canadensis*, and consequently, notwithstanding it is a very strongly marked form, should be called *P. canadensis capitalis*.

The *Perisoreus obscurus* is of much more restricted range than was at first supposed, and probably does not extend much, if any, north of Sitka. The examples alluded to in Hist. N. Am. B. (Vol. II, p. 302), as coming from "north of Sitka and in the Yukon territory," and which were stated to "incline toward the var. *canadensis*," are in reality referable to *P. canadensis*, of which they constitute a separable race, distinguished by the less extent and dingy or smoky tinge of the frontal

white patch and generally darker colors. This new race may be characterized as follows:

PERISOREUS CANADENSIS FUMIFRONS, Ridgw.

CH.—Similar to *canadensis* proper, but colors darker and more dingy throughout, and the white of the forehead obscured, or even sometimes almost wholly obliterated, by a wash of smoky gray or brown.

Hab.—Coast of Alaska.

265. *CAPRIMULGUS vociferus*, Wils.—I can see no reason whatever for removing this bird from the genus *Caprimulgus*. The type of "*Antrostomus*" is the *C. carolinensis*, Gmel., which differs from all the other *Caprimulgi* (so far as I am aware) in possessing fine lateral filaments to the rectal bristles, so that, in case this character be deemed sufficient, the genus *Antrostomus* may stand, if restricted to the single species possessing this feature. (Cf. Proc. U. S. Nat. Mus., I, pp. 142, 143, pls. i, ii.)

266. *PHALÆNOPTILUS nuttalli* (Aud.) Ridgw.—This species is decidedly peculiar in the combination of its salient points of structure, having a lengthened, naked tarsus, like *Nyctidromus*, a characteristically velvety plumage, short, even tail, and unique wing-formula; features which, taken together, render it a very well-marked genus, which may be characterized as follows:—

PHALÆNOPTILUS, gen. nov.

CH.—Differing from *Caprimulgus* and "*Antrostomus*" in the short, even tail (much shorter than the wing), and lengthened, perfectly naked tarsus (longer than the middle toe), the first quill shorter than the fourth, and the plumage with a peculiar, velvety, moth-like surface.

Type, *Caprimulgus nuttalli*, Aud.

As stated on pages 142, 143, Proceedings of the United States National Museum, Vol. I (1878), the characters supposed to separate the American *Antrostomi* from the Old World species of *Caprimulgus*, particularly the type of the latter genus (*C. europæus*, L.), are wholly intangible, with the exception of *A. carolinensis*, which has minute lateral filaments to the rectal bristles, these being in all other species perfectly smooth, or simple. On the other hand, the *Caprimulgus nuttalli* of Audubon has so many decided peculiarities of structure that it is somewhat a matter of surprise that its place in the genus "*Antrostomus*" has not been questioned ere this. In fact, *P. nuttalli* is quite as distinct in its external structure from "*A.*" *vociferus* and its allies as is the *Nyctidromus albicollis*. The more prominent differences of structure in these forms may readily be seen by comparison of the birds themselves, or by examination of the outline drawings of plates I and II of the volume of the "Proceedings" referred to above.

268. *Chordeiles ACUTIPENNIS texensis* (Lawr.) B. B. & R.—The *Chordeiles texensis* of Lawrence is merely a slightly different northern form

of *C. acutipennis* (Bodd.) Cass., of South America. (See Selater, P. Z. S. 1866, p. 134, and Hist. N. Am. B., II, pp. 400, 407.)

267. *Chordeiles* POPETUE (Vieill.) Baird.—Brisson's name *virginianus* was not restricted to this species until many years after the institution of Vieillot's name *popetue*: the latter, therefore, notwithstanding its barbarous character, is, by all the rules, entitled to retention.

269. *CYPSELUS saxatilis* (Woodh.) Ridgw.—This species agrees so very closely in details of structure with *C. melba*, Linn., that there seems to be no good reason for separating it generically from the genus *Cypselus*, unless *C. melba* also is removed to another genus. The type of *Panyptila* being the *Cypselus cayannensis*, Gmel., the elimination of *C. saxatilis* does not, of course, affect the validity of the latter genus, as properly restricted; still, there is not much more difference of form between "*Panyptila*" *cayannensis* and *C. saxatilis* than between *C. melba* and *C. apus*, the latter being the type of *Cypselus*. *C. apus* has the feet much weaker and the tarsus much more densely feathered than *C. melba*; *C. saxatilis* is nearly intermediate in this respect, though coming much nearer to *C. melba*.

273. *BASILINNA xantusi* (Lawr.) Elliot.—See Elliot's "Synopsis of the Trochilidæ\*", p. 227.

284. *Trogon* AMBIGUUS, Gould.—The species described in "Birds of North America," and figured in the atlas to that work, is the present one, and not *T. mexicanus*. The latter is chiefly distinguished by the absence of white bars on the tail-feathers, which are uniform black underneath, except the broad white tip.

295. *XENOPICUS albolarvatus* (Cass.) Bd.—In addition to the very tangible external characters pointed out by Professor Baird in his characterization of a subgenus *Xenopicus* (B. N. Am., p. 83), may be mentioned the fact that the tongue is scarcely extensile, its tip, when fully protruded, reaching only  $\frac{3}{4}$  of an inch beyond the tip of the bill, or just the same as in *Sphyrapicus thyroideus*, while in *Picus villosus harrisi* the protrusion amounts to  $2\frac{1}{2}$  inches, or  $1\frac{3}{4}$  inches more! (See Orn. 40th Parallel, pp. 546, 548, and 552, under lists of specimens of the above species.)

301. *Picoides* TRIDACTYLUS *americanus* (Brehm) B. B. & R.—As pointed out in "History of North American Birds" (Vol. II, pp. 529–534), the differences between the American and European white-backed species of this genus are very slight, and by no means sufficient to warrant specific separation. The common form should therefore be known as above, and the Rocky Mountain race, if deemed sufficiently distinct, as—

\* A Classification and Synopsis of the Trochilidæ. By Daniel Giraud Elliot, F. R. S. E., etc. Washington City: Published by the Smithsonian Institution ["Smithsonian Contributions to Knowledge," No. 317.] [March, 1879.]

301a. *Picoides TRIDACTYLUS dorsalis* (Baird) B. B. & R.

314. *Colaptes AURATUS mexicanus* (Sw.).

The above combination becomes absolutely necessary in view of the indisputable and wholesale intergradation of the *auratus* and *mexicanus* types of this species. In the present case is afforded an excellent example of the difficulties in the way of consistent nomenclature, whether binomial or trinomial.

316. *ALUCO flammeus PRATINCOLA* (Bonap.) Ridgw.—Professor Newton has, we think, clearly demonstrated\* that the proper type of the Linnæan genus *Strix* is not *S. flammea*, but *S. stridula*, subsequently made the type of Savigny's genus *Syrnium*; and that *Aluco*, Fleming (1828), should stand as the generic name of the Barn Owls. Audubon's name, "*americana*" (1839), for the American Barn Owl is antedated by *pratincola*, Bonap. (1838), which should, in consequence, stand as the subspecific name for this form.

318b. *Scops asio MACCALLI* (Cass.) Coues.—In the "Proceedings of the U. S. Nat. Mus." for 1878 (Vol. I, pp. 109–111), I formally referred the "*Scops asio* var. *enano*" of Lawrence to *S. maccalli*, Cassin, and in a foot-note on p. 111 refer Mr. Sennett's specimens to the latter. This fact, however, seems to have been overlooked by both Dr. Coues and Mr. Sennett, who, in their last paper, continue to call the variety "*S. asio enano*."†

320. *ASIO wilsonianus* (Less.).—Brisson's genus *Asio* appears to be unquestionably that which should be applied to the long-eared owls, and has long since been adopted by some authorities. Admitting that the short-eared species (*Strix accipitrina*, Pall.) cannot be separated generically, it would have to be called—

321. *ASIO accipitrinus* (Pall.) Newton.

323. *STRIX nebulosa*, Forst.—Professor Newton's very correct conclusion that the proper type of the Linnæan genus *Strix* is the *S. stridula*, necessitates the above change in the generic name of this American congener of that species.

The Floridan birds of *S. nebulosa* I find to be so different from northern examples as to well merit subspecific separation. In his memorable work on the birds of East Florida (Bull. Mus. Comp. Zool., I. p. 340) Mr. Allen refers to the much darker color of Floridan specimens, but apparently overlooks the naked toes. It is with pleasure that I dedicate this race to one who has done such eminent service not only to the ornithology of Florida, but to the science in general.

\* Cf. Yarrell's Brit. Birds, ed. 4, vol. i, p. 150, and The Ibis, ser. iii, vol. vi, pp. 94–105.

† Since these pages were put in type, I have discovered that the name stands as above given in the "Check List." The notice of the species here was therefore an oversight.



## STRIX NEBULOSA ALLENI, Ridgw.

CH.—Similar to typical *nebulosa*, but toes wholly destitute of feathers or bristles, being perfectly bare to the extreme base; colors darker than in *nebulosa*, with less ochraceous, the tail scarcely barred on the basal half, and the bars on the breast much more distinct, as well as narrower and more continuous.

Hab.—Florida (Clearwater).

The above characters I find to be constant in a series of three specimens (two ♂ and one ♀) sent to the National Museum by Col. S. T. Walker, of Clearwater, Florida. Not only are the toes perfectly bare, but the feathers clothing the tarsi are much shorter than in northern *nebulosa*, thus causing the legs to appear much more slender. The only feathering on the toes consists of a small pointed strip on the outer side of the first phalanx of the middle toe, reaching about to the second joint.

324. *STRIX occidentalis* (Xant.) Ridgw.

Assuming that the Great Grey Owls are sufficiently distinct generically from the foregoing, they should be known as—

322. *SCOTIAPTEX cinereum* (Gmel.) Swains., and[322a.] *SCOTIAPTEX cinereum lapponicum* (Retz.) Ridgw

236. *Surnia ulula* FUNEREA (Linn.) Rich. & Sw.—In the 10th edition of "*Systema Naturæ*" Linnæus describes on the same page (93) *Strix funerea* and *S. ulula*, in the order here given; the former being based on "Fn. suec. 51," the "*ulula flammeata*, Frisch. av. t. 9" being doubtfully quoted; "Habitat in Europa." *S. ulula* is based upon "Fn. suec. 52—*Ulula*, Gesn. av. 773, Aldr. ornith. l. 8, c. 6; Will. ornith. 68, t. 13, Ray. av. 26, n. 4;" the habitat also "in Europa." In neither case would the diagnoses given determine the species independent of the references. In the 12th edition, however, *S. ulula* is mentioned first, with the same diagnosis and habitat, but with additional or more explicit references. *S. funerea* follows, with an additional diagnosis which renders the species unmistakable, and a reference to "*Strix canadensis*," Briss. av. I, p. 518, t. 37, f. 2, which we know to be the American Hawk Owl. Furthermore, there is added to the habitat "*America septentrionali*." It is therefore difficult to decide which of the two names has priority as the specific designation. If the *S. funerea* is to be regarded the same in both editions, then this name, as occurring first on the page, would be entitled to that claim; but there is nothing whatever in the account of *Strix funerea* of edition 10 to show that it is anything more than the European Hawk Owl; or, in other words, the same as the species called on the same page *S. ulula*. As the matter stands, we prefer to take *funerea* of 1766 as the earliest date of the name as applied to the American bird, and to call the species *S. ulula*, the latter name being of certain application in the 10th edition, while it precedes *funerea* in the 12th.

347. *Falco FUSCO-CÆRULESCENS*, Vieill.—See Sharpe, "Catalogue of the Accipitres in the British Museum," I, p. 400.

353. *Buteo* ABBREVIATUS, Caban.—See Sharpe, as above, p. 163, who, however, refers it to the genus "*Tachytriorchis*." See, also, Selater & Salvin's "Nomenclator Avium Neotropicalium," p. 118.

363. *Polyborus* CHERIWAY (Jacq.) Caban.—See Sharpe, t. c., p. 33. This species appears to be quite distinct from *P. tharus*.

364. *PSEUDOGRYPHUS californianus* (Shaw) Ridgw.—Concerning the validity of this genus, see Bull. Nutt. Orn. Club., April, 1880, p. —.

366. *CATHARISTA* (*atrata*, Bartr.).—If the name *atrata*, as now almost universally applied to this species, is to be accredited to Bartram, it has priority over all the synonyms; but if we are to reject Bartram's names on account of his frequent "lapses" from binomialism, or his equally bad practice of omitting descriptions (which, however, is not the case with regard to his mention of the present species), then *uruba* of Vieillot (1809) takes precedence over *atrata* of Wilson (1812), which comes next in order of date.

368. *Columba* ERYTHRINA, Licht.—Although there is no law compelling the adoption of a museum name, I prefer to do so in this case rather than propose a new one, since Lichtenstein's name *erythrina* is a very appropriate one. The name by which this species has usually been known—*C. "flavirostris*, Wagler"—is "glaringly false," and, therefore, to be rejected, according to the rules of the British Association.\* It is true that the bill sometimes appears yellowish in the dried skin, but in life it is always some shade of purple or pink, whitish at the extremity. Whatever it may be, it is impossible to identify McCall's *C. solitarius* with this species. If his description was really penned from a specimen, his bird has not yet been rediscovered, no known North American Pigeon corresponding at all closely with his description. In any event it cannot be the present species, which never has "brilliant reflections" on either neck or breast, nor the back or under wing-coverts "light-red color."

378. *ORTALIS vetula maccalli* (Baird) Ridgw.—In regard to this emendation of the generic name, see Wharton, "The Ibis," Oct., 1879, p. 450. I find the Texan birds easily distinguishable from Mexican examples (true *vetula*).

380. *CANACE canadensis* (Linn.) Reich.—None of the American grouse usually referred to *Tetrao* resemble at all closely the type of the latter genus, *T. urogallus*, Linn. They appear, in fact, nearly as distinct from *Tetrao* proper as are *Bonasa* or *Pediæctes*, or other recognized American genera. It seems scarcely advisable, however, to admit a genus "*Dendragapus*" for the special accommodation of *C. obscura* in its various forms.

396. *Charadrius* DOMINICUS, Müll.—Müller's name for the American Golden Plover, dating 1776, should take precedence over *fulvus*, Gmel., bestowed twelve years later (1788), as the name of the species. The Asiatic form should therefore be called *C. dominicus fulvus* (Gmel.)

\* Cf. Bull. Nutt. Orn. Club, Jan., 1880, p. 37.



400 *bis* (Appendix). *Ægialitis* CUNONICA (Gm.) Gray.\*—This supposed new species proves to be the Lesser Ringed Plover of the Old World, *Æ. cunonica* (Gm.) Gray, the principal synonyms of which are the following. It may be considered doubtful whether the specimen really was obtained near San Francisco, as stated on the label.

*Charadrius cunonicus*, GMEL., S. N., I, 1788, 692.

*Ægialitis cunonicus*, GRAY, Cat. Brit. B., 1863, 141.—HARTING, Handb. Brit. B. 1872, 134.

*Charadrius philippinus*, LATH., Ind. Orn., II, 1790, 745.

*Charadrius fluviatilis*, BECHST., Naturg. Vög. Deutschl., 1809, 422.

*Charadrius minor*, MEYER & WOLF, Taschen. Vög. Deutschl., 1810, 324.

*Charadrius intermedius*, MÉNÉTR., Catal. —, 53.

*Charadrius zonatus*, SWAINS., B. W. Afr., II, —, 235, pl. 25.

*Ægialitis microrhynchus*, RIDGW., Am. Nat., VIII, Feb. 1874, 109 ("San Francisco, Cal.").

408. *Himantopus* MEXICANUS (Müller) Ord.—Müller's name dates 1776; thirty-one years earlier than *nigricollis*, Vieill.

413. *Scolopax* RUSTICULA (Linn.) Wharton.—See "The Ibis," Oct., 1879, p. 453.

442 *bis* (Appendix). *Numenius* TAHITIENSIS (Gm.).—The earliest name for the bird afterwards named *Numenius femoralis* by Mr. Peale is *Scolopax tahitiensis*, Gmel. (S. N., I, ii, 1788, p. 656, n. 22).

448. *AJAJA* ROSEA (Briss.) Ridgw.—The American Spoonbill being a very distinct generic type, for which Reichenbach proposed (in 1853) the name *Ajaja*, it becomes necessary to change the specific name also. There is not, unfortunately, any post-Linnean synonym for this species, with the exception of "*Platea 'mexicana*, Willoughby," as used by Gambel in 1849 (Jour. of Philad. Acad., I, p. 222). Gambel, however, gives no description; and, moreover, since the name "*mexicana*" is simply quoted from Willoughby, it seems best to adopt Brisson's very appropriate name of *rosea*, in justice to the accurate and complete description of the species in the work of that author.

454. *HYDRANASSA* TRICOLOR (Müll.) Ridgw.—If the Herons are to be subdivided at all, it seems quite necessary to recognize the generic name which, in 1858, Professor Baird proposed for this species (B. N. Am., p. 660), the earliest designation of which is *Ardea tricolor*, Müller (1776).

455. *DICHROMANASSA rufa* (Bodd.) Ridgw.—See Bull. U. S. Geol. and Geog. Survey Terr., vol. iv, no. 1, p. 246.

460. *Botaurus* LENTIGINOSUS (Montag.) Stephens.—This appears to be the earliest designation of the species.

\*Am. Nat., VIII, Feb., 1874, p. 109.

466 a (Appendix). *Rallus obsoletus*, Ridgw.—This proves to be quite distinct from *R. elegans*, being, in fact, more nearly related to *R. longirostris* (sive "*crepitans*").

472. *Gallinula galeata* (Licht.) Bp.—Quite distinct specifically from *G. chloropus*, Lath.

473. *IONORNIS martinica* (Linn.).—This species has usually been referred to either *Porphyrio*, Briss., or *Porphyryla*, Blyth, but it is exceedingly distinct generically from both these types, particularly the former. The generic name *Ionornis*, instituted for its special reception, by Reichenbach in 1853 (Nat. Syst., p. xxi), seems to be the earliest one available.

488. *Anas BOSCAS*, Linn.—See Wharton, "The Ibis," Oct., 1879, p. 453).

489 a (Appendix). *Anas fulvigula*, Ridgw.—This bird proves very distinct from *A. obscura*.

526. *Pelecanus ERYTHRORHYNCHUS*, Gmel.—This name antedates "*trachyrhynchus*, Lath.," by two years, and, being no less appropriate, there is no valid reason why it should not be retained. (Cf. Bull. Nutt. Orn. Club, Jan., 1880, p. 36.)

525. *Sula LEUCOGASTRA* (Bodd.) Salvin.—See Salvin, Trans. Zool. Soc. Lond., IX, ix, 1875, 496.

529. *PHALACROCORAX DILOPHUS cincinnatus* (Brandt) Ridgw.—This is simply the large northwestern form of *P. dilophus*, no more entitled to specific separation than var. *floridanus*, which represents the opposite extreme of size.

In regard to the generic name of the Cormorants, it appears that we will have to use *Phalacrocorax*, Briss., instead of *Graculus*, the latter, properly applied, having for its type the *Corvus graculus*, Linn., = *Gracula pyrrhocorax*, Scop. (Conf. Sharpe, Cat. Passerif. Brit. Mus., p. 146, foot-note.)

547 b. *Larus OCCIDENTALIS*, Aud.

548 a. *Larus CALIFORNICUS*, Lawr.

549. *Larus BRACHYRHYNCHUS*, Rich.

The above appear to be quite well-defined and distinct species; the first more nearly related to *L. affinis*, Reinh., than to *argentatus*; the second much nearer to *L. cachinnans*, Pall., than to *delawarensis*.

581. *OSSIFRAGA gigantea* (Gmel.) Homb. & Jacq.—A very distinct genus from *Fulmarus*.

580. *PHÆBETRIA fuliginosa* (Gmel.) Coues.—Appears to be sufficiently distinct generically from *Diomedea*.

583. *PRIOCELLA tenuirostris* (Aud.) —. —This bird seems sufficiently distinct generically from *Fulmarus*, and has been made the type of *Priocella*, by Hombron & Jacquinot (Compt. Rend., XVIII, 1844, p. 357.)

595. *PRIOFINUS melanurus* (Bonn.) —. —This species is the type of the genus *Priofinus*, Homb. & Jacq. (t. c. p. 355).

600. *Puffinus* AUDUBONI, Finsch.—The *Procellaria obscura* of Gmel. has been determined by Dr. Finsch (see P. Z. S. 1872, p. 111) to be a Pacific Ocean species, distinguished from the *Puffinus obscurus* of recent authors by its white underwing-coverts and other characters. Dr. Finsch therefore proposed for the Atlantic species the name *auduboni*, as above.

601. *Puffinis* GAVIA (Forst.) Finsch.—See Giglioli & Salvadori, Ibis, 1869, p. 66; Finsch, Jour. für Orn., 1872, p. 256.

603. *Puffinus* GRISEUS (Gmel.) Finsch.—Cf. Finsch, Jour. für Orn., 1874, p. 209; Salvin, Rowley's Orn. Misc., iv, 1876, p. 236.

619. *LUNDA cirrhata*, Pall.—Sufficiently distinct generically from the species of *Fratereula*.

623. *Simorhynchus* PYGMÆUS (Gmel.) Ridgw.—The *Alca pygmæa* of Gmelin is unquestionably the young of this species, afterward named "*S. cassini*" by Dr. Coues. *Alca kamtschatica*, Lepechin, is the same species in adult (winter?) plumage.

#### b. SPECIES AND SUBSPECIES NOT IN COUES'S CHECK LIST.

##### *SIURUS NÆVIUS* NOTABILIS, Grinnell, MS.

CH.—Similar to *S. navius*, but much larger. Wing, 3.25; tail, 2.50; bill, from nostril, .50; depth at base, .25; tarsus, .83; middle toe, .56. Above dark grayish brown, the feathers of the pileum with indistinctly darker centres. Beneath yellowish white, the throat thickly spotted, and the breast and sides heavily streaked with blackish dusky; a superciliary stripe of pale fulvous, hardly extending back to the end of the auriculars. Lores crossed by a distinct streak of black. Centre of the abdomen immaculate; lower tail-coverts with central streaks of grayish dusky; lining of the wing smoky gray. Bill brownish black, the mandible growing lighter brown basally. Feet horn-color.

Hab.—Black Hills, Wyoming (Mus. G. B. Grinnell).

The plumage of this bird is in all respects, so far as I can see, quite identical with that of ordinary darker plumaged specimens of *S. navius*, except that the superciliary stripe does not extend so far back and the streaks on the breast are broader; the former character may be merely apparent, however, and owing to the manner of skinning.

*Parus CINCTUS*, Bodd.—In accrediting this species to the North American fauna, on the strength of specimens collected in Alaska by Mr. Lucien M. Turner\*, I inadvertently called it "*P. sibiricus*, Gmel.," at the time overlooking the priority of the name *cinctus*.

MYIARCHUS MEXICANUS (Kaup) Lawr.

*Tyrannula mexicana*, KAUP, P. Z. S., Feb. 11, 1851, 51.†

*Myiarchus mexicanus*, LAWR., Ann. Lyc. N. Y., IX., 1869, 202 (nec Baird, B. N. Am., 1858, p. 179).

??? *Tyrannula cooperi*, KAUP, l. c. (Mexico).‡

*Myiarchus cooperi*, BAIRD, B. N. Am., 1858, 180 (based on the above).

*Myiarchus erythrocerus*, SCL. & SALV., P. Z. S. 1868, 631, 632 (Tobago & Venezuela).

*Myiarchus yucatanensis*, LAWR., Pr. Philad. Acad. 1871, 235.

*Myiarchus oberi*, LAWR., Ann. N. Y. Acad. Sci., I, 1877, 48 (Dominica, W. I.).

Disclaiming any desire to prolong the discussion inaugurated by me in Vol. I of these Proceedings (p. 139), I however feel called upon, by Mr. Sennett's comments in his "Further Notes on the Ornithology of the Rio Grande" (Bull. U. S. Geol. & Geog. Survey, Vol. V, No. 3, pp. 402–404), to offer a few additional remarks on the subject.

The synonymy of *Myiarchus mexicanus* (Kaup) Lawr., as given above, includes all the binomial synonyms of the species in question, so far as I am aware; and in view of Mr. Selater's positive declaration (P. Z. S. 1871, p. 84) that "*Tyrannula mexicana* of Kaup is identical with *Myiarchus cooperi* of Baird," I do not see how we can avoid using Kaup's name for the species. Mr. Selater's opinion certainly cannot be set aside, for he made actual comparison of Kaup's type specimen with the very examples which Professor Baird called *M. cooperi*, and found them "identical."

The name *erythrocerus*, Scl., was proposed three years before Mr. Selater made this discovery, and was, moreover, based on examples from Tobago, Venezuela, and Bahia, and was described as "similar to *M. cooperi* [i. e., *mexicanus*, Kaup], but much smaller," etc.

In 1871, Mr. Lawrence, being apparently unaware of Dr. Selater's identification of *T. mexicanus*, Kaup, with Professor Baird's *M. cooperi*, and accepting the latter's identification of *mexicanus* with his (L.'s) *cinerascens* of later date, redescribed the Mexican bird as *M. yucatanensis*; and in 1877, on the ground of certain differences of plumage and size, separated (from *M. "erythrocerus"*) the specimens from the Lesser Antilles (Dominica) by naming them *M. oberi*.

\* Cf. Bull. Nutt. Orn. Club, Jan., 1878, p. 37.

† "I do not . . . hesitate to decide that *Tyrannula mexicana* of Kaup is identical with *Myiarchus cooperi* of Baird."—SCL., P. Z. S. 1871, p. 84."

‡ "What *Tyrannula cooperi*, Kaup, is . . . does not now much signify. . . But it is not to be supposed that Professor Kaup would make two species of the same bird in the same paper. Therefore, *Tyrannula cooperi* of Kaup is probably not *Myiarchus cooperi* of Baird."—SCL., l. c.



Such is, in brief, the history of the case. The point at issue, however, is whether specimens of this species from the Rio Grande Valley in Texas are to be referred to *mexicanus* proper or to an assumed race, "*erythrocerus*." The species was originally introduced to the United States fauna under the name "*M. crinitus erythrocerus* (Sel. & Salv.) Cones" (Bull. U. S. Geol. & Geog. Surv. Ter., Vol. IV, No. 1, p. 32), and was subsequently mentioned by the present writer as "*M. erythrocerus* var. *cooperi*" (Proc. U. S. Nat. Mus., I, 1878, p. 138), both of which I believe to be incorrect—the former on account of the reference of the species to *M. crinitus*, and, probably, in the use of the name *erythrocerus* instead of *mexicanus*; the latter, because *erythrocerus* is the subsequent name, and cannot, therefore, be used for the specific designation, while *cooperi* is also very doubtfully referable to this species. In order, however, to present the case as briefly and clearly as possible it will be necessary to discuss the several points separately.

First, as to the reference of this species to *crinitus*: I do not see how this can possibly be done without bringing in also *M. cinerascens* and *M. stolidus* (see Hist. N. Am. B., Vol. II, p. 331); and even then I much doubt whether *crinitus* and *mexicanus* ever intergrade, since I have examined many scores of specimens, but have yet to find a specimen that is truly intermediate.\* There is, however, in Southwestern Mexico a very small race of *mexicanus*, which can be distinguished from *cinerascens* only by the extension of the rufous of the retrices to the extreme tip of the inner web, they being in every other respect apparently quite identical. There are several such examples in the national collection, obtained in Tehuantepec by Professor F. Sumichrast.

Second: It is much to be regretted that neither Dr. Kaup nor Dr. Selater give measurements of the type specimens of *T. mexicanus*, since we might then readily determine whether this name belongs to the large or the small race of the species as occurring in Mexico. Since, however, Dr. Selater remarks that "it (the said type) is certainly rather smaller in dimensions than two of my skins of this species (*i. e.*, "*M. cooperi*," Baird), and has the bill smaller"; and that "a third specimen in my collection, which I also refer to the (so-called) *M. cooperi* of Baird, agrees very well with it in general dimensions, and has the bill even slightly smaller," it appears very evident that Kaup's *T. mexicana* was not based on one of the very large individuals of this species, but one of medium size, corresponding to the Rio Grande specimens. Further than this, the individual variations among Mexican specimens of this species affect only the size and proportions, not colors—at least not to any especially noticeable extent.

Third: I find upon re-examination of all the material in the national

\* In Hist. N. Am. Birds, Vol. II, p. 331, we predicated the intergradation of these two species on the characters of an individual from Nicaragua, which, however, Dr. Cones (Pr. Philad. Acad. 1872, p. 68) says, and which I also now believe, is not distinguishable from *M. crinitus*.

collection (embracing numerous specimens received since my last paper was written), that specimens from the *patria* of *erythrocerus* proper (Venezuela, Tobago, Bahia, and other parts of South America) are uniformly darker colored than the smaller Mexican examples, though they may fully equal them in size. This darkness of color is carried to an extreme degree in Antillean specimens, and constitutes, so far as I am able to see, the sole distinguishing character of Mr. Lawrence's "*M. oberi*," as compared with the continental forms of the species *en masse*.

Finally, I therefore conclude that, whatever may be the character of Central American specimens (of course they are intermediate), or whether the name *mexicana* is to be applied to the larger or smaller race of the Mexican bird (and the odds are strongly in favor of the latter), that (1) the name *erythrocerus* should, if to be used at all, be restricted to examples agreeing strictly with the South American "race," since it is subsequent in date to *mexicanus*; and (2) that the Rio Grande birds are probably exactly like the type of the latter.\*

*Nyetidromus* ALBICOLLIS (Gmel.) Burm.—As explained some years since by Dr. Selater (see P. Z. S. 1861, p. 10, and 1866, p. 144), the earliest name for this species is *Caprimulgus albicollis* Gmel. (S. N., I, ii, 1788, p. 1030), the *C. americanus* of Linnæus, quoted by Mr. Cassin (Proc. Philad. Acad. 1851, pp. 179, 180) and some other authors (see Mr. Sennett's two lists) being unquestionably a Jamaican species belonging to quite a different genus (*Siphonorhis americana*). All the synonyms and the more important references are given in my notes in Dr. Merrill's paper (Proc. U. S. Nat. Mus., I, pp. 143 and 144).

*IACHE latirostris* (Sw.) Elliot.—This species, introduced to the fauna of the United States by Mr. Henshaw (*cf.* American Sportsman, v, Feb. 20, 1875, p. 328; Zoology Wheeler's Exp., Orn., p. 380) under the name of *Circe latirostris*, should be hereafter known by the above name, the genus *Circe* being previously employed in another branch of zoology (see Elliott, Synopsis of the Trochilidæ, p. 234).

#### NOMONYX, gen. nov.

CH.—Similar to *Erismatura*, but differing from all the species of that genus in the form of the maxillary unguis, which is similar to that of *Fulix* and allied genera, the same being in *Erismatura* the most peculiar and important generic character.

Type, *Anas dominica*, Linn.

Altogether the most distinctive feature of the genus *Erismatura* consists in the remarkably peculiar conformation of the maxillary unguis,

\* It seems proper to offer here a word of explanation in reference to the second paragraph on page 403 of Mr. Sennett's paper, which says (referring to my remarks on this species in Dr. Merrill's list): "There is no notice whatever of my specimen from Hidalgo, Tex., . . . which is in the National Museum, and which is the first record of its existence within our limits, and which Mr. Ridgway no doubt examined when he coincided with Dr. Coues as to its identification." The explanation I have to make is, that at the time my paper was written and printed the specimen in question was not in the National Museum collection, but, with other birds, had been returned to Mr. Sennett, at his request, for examination.



or nail of the upper mandible. This, viewed from above, is extremely small, narrow, and linear, the broader terminal half being bent very abruptly downward and backward, so as to be visible only from in front or below. With the sole exception of *Anas dominica*, Linn., all the species usually referred to this genus agree strictly with the type, *Anas leucocephala*, Scop., notwithstanding other characters are more or less variable. *Anas dominica*, Linn., has the nail of normal form, or very much like that prevailing among the ducks generally, and on this account should be separated generically from *Erismatura*.

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**DESCRIPTION OF A NEW SPECIES OF BIRD OF THE FAMILY  
TURDIDÆ, FROM THE ISLAND OF DOMINICA, W. I.**

**By GEO. N. LAWRENCE.**

*Margarops dominicensis*.

*Margarops herminieri*, Lawr. nec Lafr., Proc. U. S. Nat. Mus., vol. I, p. 52.

*Male*.—The entire upper plumage is of a rich dark brown, the crown is darker and has the edges of the feathers of a lighter shade; tail and quill feathers of a darker brown than the back; axillars and under wing-coverts white; the lores are blackish brown; the feathers back of the eyes and the ear-coverts have narrow shaft streaks of pale rufous; the feathers of the neck and upper part of the breast are of a warm dark brown, those of the chin and middle of the throat with light rufous centres, those of the lower part of the neck and the upper part of the breast have also light rufous centres, but in addition each feather has a light terminal spot; on the lower part of the breast and on the sides the feathers have white centres, bordered strikingly with brown; the markings of the breast-feathers are squamiform in shape, those of the sides lanceolate; the abdomen is white, a few feathers on the upper part are very narrowly margined with brown; under tail-coverts brown, terminating with white; outer feathers of thighs brown, the inner whitish; "iris tea-color;" there is a naked space around the eye; bill yellow, with the basal half of the upper mandible dusky; tarsi and toes pale yellow.

Length (fresh), 9 inches; wing, 5; tail  $3\frac{1}{2}$ ; tarsus,  $1\frac{3}{4}$ ; bill from front,  $1\frac{15}{16}$ , from gap,  $1\frac{1}{8}$ .

Type in United States National Museum.

Mr. Ober sent five specimens of this form from Dominica, all males and closely resembling each other. It is probable, as in the allied species, that the females do not differ in plumage materially from the males.

Mr. Ober's collection from Dominica contained three species of *Margarops* which I never had seen before. These were referred to known species, two of them, I think, correctly; but the one which is the subject of this article I now find was erroneously considered to be *M. herminieri*, Lafr. I supposed these species would be the same as those recorded

from the neighboring islands, as they agreed well with the descriptions given of them, and there were no available specimens to compare with.

As soon as I had finished the examination of the birds of each island collected by Mr. Ober, they were placed in a box by themselves, and not disturbed again except for an occasional comparison. The collection from Guadeloupe, containing specimens of the true *M. herminieri*, Lafr., was not received until more than a year after that from Dominica. These specimens I labelled *M. herminieri*, Lafr., as a matter of course, they being from the locality of the type. The difference between the birds from the two islands was not observed at that time, as no comparison was made.

This winter, having occasion to review the species of *Margarops*, I got the specimens from the different islands together for the first time, and at once saw that the species from Dominica was quite distinct from the Guadeloupe bird. It differs from *M. herminieri*, Lafr., in being less in length, of a more robust form, the bill stouter, and the tail shorter; the brown coloring throughout is much darker and of a ruddy cast, instead of olivaceous; the centres of the feathers on the throat and upper part of the breast are much more rufous, and have black spots at their ends; the abdomen is pure white, whereas in *M. herminieri* the lower part of the breast and the abdomen are covered with lanceolate-shaped markings, which are very striking, each feather being white, with a strongly defined brown border; only a very small space on the lower part of the abdomen is white; *M. herminieri* has the white ends of the under tail-coverts edged narrowly with pale brown; in the new species they are white without borders, and it has the tarsi and toes stronger and paler in color than those of *M. herminieri*.

FEBRUARY 1, 1880.

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**NOTES ON A COLLECTION OF FISHES FROM EAST FLORIDA, OBTAINED BY DR. J. A. HENSHALL.**

**By DAVID S. JORDAN, M. D.**

During the past winter (1878-'79) a collection of fishes was made for the writer by Dr. J. A. Henshall, of Cynthiana, Ky., in the streams and inlets of Eastern Florida. The number of species obtained was not large, but the specimens were preserved in excellent condition, and among them are several of interest. Two species (*Gerres plumieri* and *Umbrina broussoneti*) had not been previously recorded from the coast of the United States. Three others were, at the time of collection, new to science. One of these has been lately described, under the name of *Jordanella floridae*, by Messrs. Goode and Bean. The others have been already noticed by me in these proceedings as *Zygonectes rubrifrons* and *Zygonectes henshalli*.

The marine species were obtained from Indian River and from the neighboring coast; the cyprinodonts, centrarchids, and other fresh or brackish water species chiefly from San Sebastian River and tributaries.

### DIODONTIDÆ.

1. *Chilomycterus geometricus* (Schneid.) Kaup.

### URANOSCOPIDÆ.

2. *Astroscopus y-græcum* (C. & V.) Gill.

A single fine specimen of this beautiful species. Dr. Henshall informs me that this specimen in life exhibited strong electrical powers, these powers apparently having their seat in the naked skin on the top of the head. So far as I know, such phenomena have not hitherto been ascribed to any fish of this family. I therefore put this statement on record, in hopes that subsequent observers of this rare fish may be able to verify it.

### ECHENEIDIDÆ.

3. *Echeneis naucrates* L.

A single specimen, with 22 laminae in the disk.

### CARANGIDÆ.

4. *Selene argentea* Lac.

Numerous fine large specimens. Specimens lately described from the Pacific coast under the name of *Argyrosus pacificus*, Lockington, appear to belong to this species.

5. *Carangus chrysus* (Mitch.) Girard.

6. *Chloroscombrus chrysurus* (Linn.) Gill.

7. *Oligoplites occidentalis* (L.) Gill.

Several fine specimens of this highly interesting species. The character of five (instead of seven) dorsal spines, assumed to distinguish *Oligoplites* from *Scombroides* Lac. (*Chorinemus* C. & V.), is perhaps of insufficient value for generic distinction. Some of the species of *Scombroides* have, however, the dermal productions really scale-like, instead of the irregular linear imbedded ridges found in *Oligoplites*. This character may for the present, until all the species of the group are examined, be held to distinguish the latter genus.

### SCIÆNIDÆ.

8. *Umbrina broussoneti* Cuv. & Val.

Two fine specimens of this West Indian species were obtained by Dr. Henshall. These are the first yet recorded from the United States. The species is not included in Goode's Catalogue of Bermudan Fishes, nor

in any of Poey's lists of the fishes of Cuba. It is, therefore, an important addition to our fauna. This specimen agrees very fully with Günther's description of *Umbrina broussoneti*, and with Cuvier and Valenciennes's description of *Umbrina coroides*. C. & V.'s description of *U. broussoneti* gives the number of rays in the dorsal fin as X. I, 25. My specimens have D. X. I, 28.

## GERRIDÆ.

### 9. *Gerres plumieri* Cuv. & Val.

A single fine specimen of this beautiful species. It has not been previously recorded from the coasts of the United States.

## SPARIDÆ.

### 10. *Lagodon rhomboides* (L.) Holbr.

## PRISTIPOMATIDÆ.

### 11. *Lutjanus caxis* (Schneider) Poey.

A single fine specimen.

## CENTRARCHIDÆ.

### 12. *Micropterus pallidus* (Raf.) Gill & Jordan.

Dr. Léon Vaillant (Mission Scientifique au Mexique: ined.) divides this species provisionally into two, adopting the name "*Micropterus salmoides*" for the ordinary form, and that of *Micropterus nuecensis* (Baird & Girard) for the southwestern form (Texas and Mexico). According to him the two are externally identical, but *M. nuecensis* is distinguished by the presence of a small patch of teeth on the tongue, the tongue being entirely smooth in the ordinary form.

I have examined a number of specimens in regard to this point.

I find lingual teeth in the following specimens:

(1.) Two specimens, one large one small, from the Falls of the Ohio.

(2.) One small specimen from a tributary of White River at Bloomington, Ind.

(3.) One specimen (in the museum at Paris) from Texas.

I find them absent in the following:

(1.) Several specimens in Henshall's collection from Indian River.

(2.) Specimen from Neuse River.

(3.) Specimens from White River at Indianapolis.

(4.) Specimens from Lake Erie.

The presence of these teeth evidently does not depend on age, and apparently not on sex. It may be a specific feature, but I am inclined at present to think it only a feature of individual variation. I have not seen such teeth in the small-mouthed black bass.

13. *Chænobryttus viridis* (C. & V.) Jor.

14. *Lepomis pallidus* (Mitch.) Gill & Jor.

The recent rejection of the name "*pallidus*" for this species by my friend Professor Goode (Proc. U. S. Nat. Mus. 1879, 139) is due to his having overlooked the fact that Mitchell has a *Labrus pallidus* as well as a *Bodianus pallidus* in his Memoir on the Fishes of New York. The latter, as Professor Goode observes, is *Bairdiella argyroleuca*; the former is *Lepomis pallidus*.

15. *Lepomis punctatus* (Cuv. & Val.) Jor.

(*Lepomis apiatus* Cope.)

Several fine specimens.

16. *Enneacanthus obesus* (Baird) Gill.

(*Bryttus fasciatus* Holbrook = *Bryttus obesus* Baird?).

"*Enneacanthus milnerianus* Cope" is included in Goode's list (Proc. U. S. Nat. Mus., II, 1879, 114) of the fishes of Florida. This species appears in my list of valid species of Centrarchidæ in Bulletin X of the National Museum. It is a nominal species, and came into the lists in this way: While my paper in Bulletin X was passing through the press, Professor Cope kindly sent me the proof-sheets of a paper on the fishes of the Saint John's, which has since appeared in the Proc. Am. Philos. Soc. In this paper a new species with the above name was described. This species, however, Professor Cope saw fit to suppress in the publication of the paper, he having identified it with *Enneacanthus fasciatus*.

## MUGILIDÆ.

17. *Mugil brasiliensis* Agassiz. White Mullet.

Our other common species of *Mugil*, the striped mullet, *Mugil plumieri* and *Mugil lineatus* of authors, is doubtless the species for which the name of *Mugil albula* L. should be retained.

## SCOMBERESOCIDÆ.

18. *Hemirhamphus unifasciatus* Ranz.

## CYPRINODONTIDÆ.

19. *Jordanella floridæ* Goode & Bean.

Many specimens of this interesting species were obtained by Dr. Henshall. The females differ from the males chiefly in the lower vertical fins.

20. *Zygonectes rubrifrons* Jordan.

Numerous specimens.



21. *Zygonectes henshalli* Jordan.

Still more abundant. This species and the preceding are very closely related, and are both nearly intermediate between *Zygonectes* and *Fundulus*. The current genera related to *Fundulus* are separated by characters of very dubious value.

22. *Fundulus* sp.

A small specimen with pale cross-bars; not suitable for identification.

23. *Gambusia patruelis* B. & G.

Two specimens, agreeing with the descriptions of *Gambusia holbrooki* of Girard and Günther, and with Girard's figure of *Gambusia patruelis*. The two species are probably identical. The black bars on the caudal and the oblique suborbital blotch are characteristic color-marks.

## CATOSTOMIDÆ.

24. *Erimyzon goodei* Jordan.

Many specimens.

## SILURIDÆ.

25. *Amiurus erebennus* Jordan.

Many small specimens.

## ANGUILLIDÆ.

26. *Anguilla rostrata* (Le Sueur) DeK.

A comparison of these Florida specimens with a series of eels from Venice renders it evident that our American eel is not identical with *Anguilla vulgaris* of Europe, as I with others have supposed.

In our species the beginning of the dorsal is notably more posterior than in the European one. In Venetian specimens the distance from the snout to the base of the dorsal is contained  $3\frac{2}{3}$  times in the total length of the fish. In Florida specimens the same distance is contained barely 3 times in the total length.

The same difference is expressed differently but correctly by Dr. Günther (Cat. Fish Brit. Mus., VIII, 24). He ascribes to *A. vulgaris* the character of—

“The length of the head is nearly equal to the distance between the commencements of the dorsal and anal fins.”

And to *A. bostoniensis* (*rostrata*)—

“The length of the head is conspicuously more than the distance between the commencements of the dorsal and anal fins.”

The band of vomerine teeth also appears to extend farther back in *A. vulgaris* than in *A. rostrata*.



NOTES ON A COLLECTION OF FISHES FROM SAINT JOHN'S RIVER,  
FLORIDA, OBTAINED BY MR. A. H. CURTISS.

By DAVID S. JORDAN.

A small collection of fishes from Saint John's River was sent to Prof. H. E. Copeland and myself some years ago by Mr. A. H. Curtiss. As this collection contains some specimens of interest, a list is here given:

1. *Siphonostoma* sp. (*Syngnathus* Auct.).

Two specimens of a variety or species of this genus, apparently undescribed, are in this collection. I have specimens of three types, subspecies, or species of *Siphonostoma* from our Atlantic coast, which may be thus compared:

	<i>a. fuscum</i> Storér. (Wood's Hole, Mass.)	<i>b. louisianæ</i> Gthr.? Beaufort, N. C.	<i>c. ———</i> . Saint John's River, Fla.
Dorsal rays .....	35; 38; 40.....	33; 37.....	30; 31. 15 + 33.
Rings .....	18 + 37.....	18 + 33 (♂); 20 + 33 (♀) ..	Shorter than head.
Dorsal fin .....	Longer than head.....	Shorter than head.....	Very high in females; black, with paler spots.
Dorsal fin .....	Dark-spotted at base ..	Dusky at base or plain..	On 3 + 5 rings. Shorter than rest of head.
Base of dorsal fin.....	On 4 + 5 rings.....	On 3 + 5 rings.....	On 3 + 5 rings.
Muzzle.....	Shorter than rest of head.	Much longer than rest of head; longest in females.	Shorter than rest of head.
Distance from snout to front of dorsal.....	3 times in total length ..	2½ in length.....	2½ in length.
Head contained .....	9 times in length.....	7 times in length.....	7 times in length.
Tail.....	½ longer than rest of body	½ longer than rest of body.	½ longer than rest.
Belly in females.....	Scarcely carinate .....	Scarcely carinate .....	With a sharp black ca- rina. Color darker and body stouter than in the others.

These characters are all evidently subject to much variation. If these are true species, they differ from each other little more than the two sexes of the same form differ.

It seems to me that the specific names *fuscus*, *fasciatus*, *viridescens*, and *peckianus* are all based on individuals like those above noted from Wood's Hole.

2. *Aphoristia plagiusa* (L.) Jor. & Gill.
3. *Chloroscombrus chrysurus* (L.) Gill.
4. *Archosargus probatocephalus* (Walb.) Gill.
5. *Lagodon rhomboides* (L.) Holbr.
6. *Micropterus pallidus* (Raf.) Gill & Jor.
7. *Epinephelus* sp. ? (One very young specimen.)
8. *Orthopristis fulvomaculatum* (Mitch.) Gill.
9. *Gobiosoma alepidotum* (Lac.) Grd.
10. *Chirostoma* sp.
11. *Hemirhamphus unifasciatus* Ranz.
12. *Fundulus* sp.
13. *Mollienisia latipinna* Le Sueur.
14. *Brevoortia tyrannus* (Latrobe) Goode.
15. *Megalops thrissoides* (Bloch) Günther (Scales).
16. *Lepidosteus osseus* (L.) Ag. (Scales).

## NOTES ON A COLLECTION OF FISHES FROM SAN DIEGO, CALIFORNIA.

By DAVID S. JORDAN and CHARLES H. GILBERT.

The writers have spent the greater part of the month of January, 1880, in the collection and study of fishes at San Diego, Cal., in the interests of the United States Fish Commission. As some of the species obtained are new to science, and others new to the United States fauna, it is thought advisable to present an annotated list in advance of the publication of a more extended report.

## HIPPOCAMPIDÆ.

1. *Hippocampus ingens* Girard.

One large specimen seen.

## SYNGNATHIDÆ.

2. *Syngnathus leptorhynchus* Girard.

(*Syngnathus arundinaceus* Girard.)

Not uncommon.

## PLEURONECTIDÆ.

3. *Paralichthys maculosus* Girard.

Very abundant. There seems to us no doubt of the correctness of Lockington's identification of the "*Uropsetta californica*" with this species. The caudal fin in the adult is somewhat double concave; in the young the middle rays are more produced. This species is both dextral and sinistral. Out of twenty-six examples examined in reference to this point fifteen were found to be sinistral and eleven dextral.

4. *Citharichthys sordidus* (Girard) Günther.

Not common; one specimen seen.

5. *Hypsopsetta guttulata* (Girard) Gill.

Common.

## SOLEIDÆ.

6. *Aphoristia atricauda* sp. nov.

Body oblong-lanceolate, anteriorly somewhat blunt, regularly narrowed behind and ending in a point, the snout rather abruptly truncate, eyes and color on the left side. Eyes very small, nearly even behind, the upper eye the larger and extending farthest forward. A single nostril in front of the interorbital space and apparently a single smaller one below it. Mouth moderate, extending to opposite the eye, somewhat

turned toward the eyed side; lips large, not fringed, the upper with a small blackish papilla in advance of lower eye. This is apparently normal, but it may be a detached piece of skin, hardened by the alcohol. Upper jaw scarcely produced, not forming a hook. Teeth small, on the blind side only, the edge of the jaw on the eyed side forming a smooth ridge.

Gill-openings narrow, not extending up to the level of the mouth. Scales very small, ctenoid, pretty regular over the body, much smaller on the head, the rows of scales rendered very distinct by black dots, the stripes converging towards the snout. Scales on the two sides of the body similar. No lateral line on either side. About 105 scales (100 to 110) in a longitudinal series from the head to the tail; 45 to 50 in a cross-series.

Dorsal fin beginning on the head, continuous with the anal around the tail. Ventral fin of the colored side only present, nearly on the ridge of the abdomen, and *separated from the anal* by an interval half longer than the cleft of the mouth. Rays of the middle parts of the dorsal and anal fins with a fleshy border at base on the blind side.

Dorsal rays about 100; anal rays 80; no distinct caudal fin.

Coloration brownish olive, with vertical dark half-bars, irregular in size and position, some of them coming down from the back and others up from the belly, these posteriorly nearly meeting, but anteriorly alternating. Streaks of dark points along the rows of scales, these forming very distinct longitudinal streaks. Posterior part of dorsal and anal broadly edged with black. Right side plain white.

*Measurements.*

	Inches.
Length .....	4.8
Depth (proportion of length).....	.275
Length of head .....	.18
Diameter of eye.....	.02
Interorbital space.....	.01
Cleft of mouth.....	.06
Length of snout .....	.045
Distance from snout to dorsal.....	.085
Distance from snout to anal.....	.25
Height of dorsal.....	.08
Height of anal.....	.085
Length of caudal.....	.08
Length of ventral.....	.05
Interval between ventrals and anal.....	.085
Depth of gill-opening.....	.095

This species is known to us from a single specimen taken by a Chinese fisherman, Ah Sam, in the Bay of San Diego. This specimen is now in the collection of the United States National Museum, No. ——. In form and number of scales, fin-rays, etc., it resembles *Aphoristia ornata* from the West Indies, but the ventral fin is remote from the anal.

## BATRACHIDÆ.

7. *Porichthys porosissimus* (C. & V.) Günther.

Very common.

## BLENNIIDÆ.

8. *Heterostichus rostratus* Girard.

Found in the "kelp" outside the harbor.

9. *Gibbonsea elegans* Cooper.

A single specimen taken in the rock-pools on Point Loma.

10. *Hypleurochilus gentilis* (Grd.) Gill.

With the preceding, and more common.

## GOBIIDÆ.

11. *Gillichthys mirabilis* Cooper.

Exceedingly abundant in the shallow waters of the bay. Only small specimens seen, the maxillary in these being much less developed than in the adult.

## COTTIDÆ.

12. *Leptocottus armatus* Girard.

Common in the Bay of San Diego.

13. *Oligocottus analis* Grd.

Allied, but not closely, to *Artedius quadriseriatus* Lockington.

Body compressed, especially behind, not much depressed anteriorly; head comparatively small, scarcely depressed, narrowed and rather pointed anteriorly, its outline triangular as viewed from above; snout strongly decurved in profile; mouth moderate, horizontal, the lower jaw included; maxillary reaching to opposite posterior margin of pupil; premaxillary anteriorly below the level of the eye; eyes large, high up, close together, as long as the snout,  $3\frac{1}{2}$  in head, their diameter double the width of the deep interorbital space, which has a deep lengthwise groove; nasal spines prominent; a deep cross-furrow behind them, which forms with the interocular furrow a V-shaped figure; preopercle with a blunt process, on which is a spine directed upwards and outwards; no scales on the head; no other spines on the head.

Branchiostegals 6. Gill membranes broadly united, without isthmus.

First dorsal beginning in front of the posterior edge of the opercle, its first two spines set close together at base, diverging above, and shorter than the third.

Dorsal fins contiguous, but not united, neither of them specially elevated; pectoral fin reaching beyond front of anal, its lower rays with the skin thickened, and projecting much beyond the membranes; caudal fin slightly rounded; anal papilla very conspicuous.

Fin rays: D. IX 16; A. 13-14; V. I, 3; P. 16; C. 10 +.

Posterior part of body covered with minute, imbedded, non-imbricate, pectinate scales, which cover most of the posterior part of the body above and cease anteriorly behind the middle of the spinous dorsal in front and at the posterior third of the soft dorsal behind; some scales also along the region of the lateral line anteriorly; a series of somewhat larger but still minute scales at base of dorsal, one below each ray, and another along lateral line; anteriorly, cirri take the place of the pectinations on the scales.

No prickles on the skin. On the head and anterior parts of the body are very many long white, simple, bifid or trifid cirri, so that the living fish appears almost "woolly" with them. Some of these cirri on the nasal bones; a patch between and behind the eyes; the whole top of the head sparsely covered; two or three on the posterior edge of the maxillary; edge of the cheeks fringed with them as with a gray beard. A conspicuous row of them along the lateral line, which ceases somewhat behind the beginning of the scaly area. A row of cirri along the base of the spinous dorsal extending to about the seventh ray of the spinous dorsal. Many scattering cirri between the dorsal and lateral line. Skin of head with many mucous pores.

Body dark, clear olive-green, with about five irregular bars of darker greenish; much mottled and spotted, some of the spots above clear blue, some rusty red, and the most of them blackish. A dark bar at base of caudal; lower part of sides with round black spots posteriorly. Fins all with cross-bars made of dark spots and lighter areas.

*Measurement of largest specimen--from Point of Rocks.*

Total length .....	4	inches.
Length to base of caudal .....	3.45	inches.
Length of head (percentage of length to base of caudal) .....		.30
Depth of body .....	"	.25
Least depth of body .....	"	.095
Diameter of eye .....	"	.07
Width of head .....	"	.20
Depth of head .....	"	.17
Length of maxillary .....	"	.12
Distance from snout to dorsal .....	"	.27
Length of first dorsal .....	"	.27
Length of second dorsal .....	"	.37
Height of first dorsal .....	"	.12
Height of second dorsal .....	"	.15
Length of anal .....	"	.30
Height of anal .....	"	.13
Length of pectoral .....	"	.33
Length of ventral .....	"	.22
Length of caudal .....	"	.20
Length of longest cirri .....	"	.04
Length of anal papilla .....	"	.06

This description is drawn from two adult examples taken at Point of Rocks, near San Diego, just south of the line of Mexico, and from about



fifteen examples of various sizes taken at the "mussel beds" on Point Loma, near San Diego. These are numbered —? in the museum collection. It inhabits cup-shaped pools in the rocks between tide-marks lurking in the *Corallina*, and may be caught at low tide. Its quick movements when alarmed render this, however, a matter of some difficulty.

14. *Scorpænichthys marmoratus* Grd.

Occasionally taken in the kelp.

SCORPÆNIDÆ.

15. *Sebastapistes guttatus* (Girard) Gill.

Not uncommon.

16. *Sebastichthys atrovirens* Jor. & Gilb. MSS.

Occasionally taken in the kelp.

LATILIDÆ.

17. *Caulolatilus princeps* (Jenyns) Gilb.

Common in the kelp.

SCOMBRIDÆ.

18. *Sarda chilensis* (C. & V.) J. & G.

Abundant off shore in the fall.

PERCIDÆ.

19. *Paralabrax clathratus* Grd.

Frequent.

20. *Paralabrax maculofasciatus* (Steindachner) Gill.

Common in the bay.

21. *Stereolepis gigas* Ayres.

Occasionally taken off the coast.

SPARIDÆ.

22. *Girella nigricans* (Ayres) Gill.

The young common in the rock-pools.

## SCIÆNIDÆ.

23. *Cynoscion magdalenæ* (Steindachner) Jor. & Gilb.

Common in the bay of San Diego.

24. *Menticirrhus elongatus* (Günther) Gill.

A large species of *Menticirrhus*, probably *Umbrina elongata* of Günther, is taken occasionally in the bay. We have obtained one specimen.

25. *Corvina saturna* (Girard) Steindachner.

Not uncommon.

26. *Roncador stearnsi* (Steindachner) Jor. & Gilb. (gen. nov.).

Common. This species, having a serrated preopercle and only villiform teeth in either jaw, is not a *Corvina* as that genus is understood by many recent writers. Its relations are rather with *Scienops ocellatus*, with which it is, however, hardly congeneric. We propose to consider it as the type of a distinct genus or subgenus, for which the name *Roncador*, applied to it by the Italian fishermen, may be adopted. This word appears also in the Latin name of a related species, *Umbrina ronchus*.

*Roncador*, gen. nov. Allied to *Corvina* and *Scienops*.

Body moderately elongated, the head deep, the profile declivous, lower jaw included; both jaws with a broad band of villiform teeth only; no enlarged teeth or canines; pseudobranchiæ present; preopercle strongly and evenly dentate posteriorly, entire below; spines strong, the second of the anal very robust, but not very long; caudal fin lunate, air-bladder large.

This species, *Roncador stearnsi*, is as readily distinguished by the black pectoral spot as its relative, *Scienops ocellatus*, is by the black spot on the caudal.

## EMBIOTOCIDÆ.

27. *Embiotoca jacksoni* Ag.

Common.

28. *Amphistichus argenteus* Ag.

Occasional.

29. *Ditrema furcatum* (Grd.) Günther.

Common.

30. *Hyperprosopon arcuatum* Gibbons.

Not uncommon.

31. *Cymatogaster aggregatus* Gibbons.

Very abundant.

32. *Abeona minima* (Gibbons) Gill.

Occasional.

## LABRIDÆ.

33. *Pimelometopon pulcher* (Ayres) Gill.

Very abundant in the kelp outside the bay.

## SPHYRÆNIDÆ.

34. *Sphyræna argentea* Girard.

Very abundant outside the bay in the fall.

## ATHERINIDÆ.

35. *Chirostoma californiense* (Girard) Gill.

Exceedingly abundant.

36. *Atherinops affinis* (Ayres) Steindachner.

Scarcely less common.

37. *Leuresthes tenuis* (Ayres) Jor. & Gilb. (gen. nov.)

*Leuresthes*, gen. nov., allied to *Atherinops* Steindachner, but with the teeth wanting or reduced to slight or deciduous asperities. In the specimens which we have obtained of this species no teeth whatever are observable.

The much greater width of the posterior portion of the premaxillary in *Chirostoma*, *Atherinops*, and *Leuresthes* serve to distinguish these genera from *Atherina*, in addition to the differences in the form of the mouth. *Labidesthes* Cope has, like *Atherina*, a slender premaxillary, but the mouth is curved and the jaws much produced forwards. The group called by Girard *Heterognathus* has likewise a broad premaxillary. It is probably not separable generically from *Chirostoma*, although the lower jaw is much stronger and some teeth are present on the vomer.

*Leuresthes tenuis* is occasionally taken in San Diego Bay, but it is much less abundant than the others and attains a smaller size.

## MUGILIDÆ.

38. *Mugil mexicanus* Steindachner.

Very abundant in San Diego Bay. Our specimens have the anal III, 8, instead of III, 7, as stated by Dr. Steindachner.

## SCOMBERESOCIDÆ.

39. *Hemirhamphus* sp. incert.

The young of a species of *Hemirhamphus* is very abundant in San Diego Bay. We are at present unable to identify it with any of the known species, but having seen no specimens over four inches long, we

do not think proper to describe it as new. The rays both in dorsal and anal are 14 or 15; the lower jaw is contained 4 times in the total length. It is allied to *H. pleii* and *H. unifasciatus*, but it is probably distinct from both.

**40. *Belone exilis* Girard.**

Occasionally taken. One specimen seen.

## CYPRINODONTIDÆ.

**41. *Fundulus parvipinnis* Girard.**

Very common in the Bay of San Diego.

## ALBULIDÆ.

**42. *Albula vulpes* (L.) Goode.**

This species visits the bay at intervals, in considerable schools. Several specimens were obtained.

## CLUPEIDÆ.

**43. *Clupea sagax* Jenyns.**

Very abundant in San Diego Bay. The very largest are nearly plain in coloration. The ordinary specimens have a very distinct series of round, blackish spots along the sides of the back, with smaller ones above it, which form stripes along the rows of scales.

**44. *Clupea mirabilis* Girard.**

Very abundant in San Diego Bay. The vomerine teeth in this species are very few and often not to be found. It should not be generically separated from the preceding.

## ENGRAULIDÆ.

**45. *Engraulis delicatissimus* Girard.**

Very common.

**46. *Engraulis ringens* Jenyns.**

Very common.

## MURÆNIDÆ.

**47. *Gymnothorax mordax* (Ayres) Jor. & Gilb.**

Not rare in rock-pools. This species is extremely pugnacious, striking at a stick after the fashion of a snake. It is also very tenacious of life.

Length of tail almost exactly equal to that of the rest of the body, head forming one-seventh of the total length; snout short, narrow, and pointed, occipital region becoming fleshy and much elevated with age; dorsal fin beginning immediately in front of the gill openings.

Tube of the anterior nostril half as long as the eye; the posterior nostril with a slight membranous expansion, not forming a tube; diameter of eye contained  $2\frac{1}{2}$  times in the length of the snout, being placed nearly above the middle of the gape; gill opening slightly longer than the eye.

Sides of the upper jaw with two series of teeth posteriorly; the outer series small, close-set, somewhat triangular in form, slightly recurved, immovable; the inner series similar in form, but much larger, depressible, the series not extending so far back as the outer and consisting of about five teeth; the two series separated by a well-defined groove; in front of these, and continuous with the outer series, are three nearly fixed knife-shaped teeth, the posterior the larger, next a movable tooth similar to the last fixed one but smaller, and three small fixed teeth in front. On the middle line of the vomer are three depressible, fang-like, arrow-shaped teeth, the first rather smaller than the largest lateral teeth, the other two subequal and considerably larger, the posterior one very freely movable. These teeth are subject to some variation in different individuals, and are seldom quite alike on both sides of the same fish.

In the lower jaw is a single series corresponding to the fixed series in the upper jaw. These are similarly enlarged in front, where the series is partly duplicated and some of the teeth are movable. The teeth in the lower jaw are broader and more directed backwards than those in the upper jaw.

### MYLIOBATIDÆ.

#### 48. *Myliobatis californicus* Gill.

(*Rhinoptera vespertilio* Girard.)

The commonest of the numerous sting-rays in San Diego Bay.

### DASYBATIDÆ.

#### 49. *Pteroplatea marmorata* Cooper.

Common in San Diego Bay. Probably distinct from *P. hirundo*, having a narrower disk and shorter tail, with distinct dermal fold above and below.

#### 50. *Urolophus halleri* Cooper.

Common. This species is certainly not identical with *U. torpedinus*, in the synonymy of which species it is placed by Dr. Günther. Its skin is entirely smooth. It is probably a valid species, more nearly allied to *U. cruciatus* than to *U. torpedinus*.

#### 51. *Dasybatis dipterurus* sp. nov.

Allied to *Dasybatis centrurus* and *D. pastinaca*.

Disk rhomboid, slightly broader than long; anterior margins nearly straight forwards, meeting in a very obtuse angle; posterior margins curved; lateral angles rounded. Tail nearly half longer than disk, with



a conspicuous cutaneous fold below and a smaller but evident one above. Upper jaw considerably curved, with a slight convex protuberance in front, which fits into a slight emargination in the lower jaw, which is convex, its outlines corresponding to the curves of the upper jaw. Bands of teeth wider in front than laterally. Inside of mouth behind the lower jaw with three fleshy processes. Teeth about  $\frac{2\frac{1}{2}}{2\frac{1}{2}}$ ; about 8 in a cross-series in the upper jaw and 10 in the lower.

Color light brown, somewhat marbled with darker, but without distinct spots; tail blackish; belly white.

Skin *everywhere* perfectly smooth in all the specimens seen.

*Measurements of two specimens.*

	No. 1.	No. 2.		
Length of disk (in inches).....	8.75	8.50		
Length of tail (in inches).....	12.25	12.40		
Breadth of disk.....	Percentage of length of disk....		1.04	1.10
Distance from disk to dorsal fold....	"	....	.45	.53
Length of dorsal fold.....	"	....	.135	.155
Height of dorsal fold .....	"	....	.0175	.019
Distance from root of tail to anal fold.	"	....	.38	.375
Length of anal fold.....	"	....	.30	.365
Height of anal fold.....	"	....	.0225	.0225
Length of snout from eye.....	"	....	.21	.18
Interorbital width.....	"	....	.13	.115
Snout to scapular ridge.....	"	....	.32	.335
Distance between nostrils .....	"	....	.155	.15
Width of mouth.....	"	....	.11	.11
Length of branchial area .....	"	....	.195	.18
Width of branchial area (in front)...	"	....	.32	.31
Mouth to vent.....	"	....	.70	.70
Length of caudal spine.....	"	....	(lost)	.335
Distance of spine from disk.....	"	....	.35	.325

This species is known to us from four female specimens taken in San Diego Bay. These range in length from 18 to 24 inches, and are therefore but partially grown. Several other specimens, some of them larger, have been seen in a pile of refuse fish thrown away by the Chinese fishermen. These were, however, too far gone for preservation or description.

**52. *Platyrrhina exasperata* sp. nov.**

Disk rhombic, about as broad as long, the snout prominent, but bluntish at the tip, the angle made by the anterior margins of the pectorals rather less than a right angle, but the snout itself rounded at the tip. Anterior margin of pectorals nearly straight.

Eyes rather large; nasal ridges well separated, little converging, not meeting anteriorly. Mouth rather narrow, slightly convex forward. Teeth about  $\frac{3\frac{2}{6}}{2\frac{2}{6}}$ . Nostrils with a large anterior flap, which projects backwards and covers a narrower posterior flap.

Ventral fins separate, entire, their outer margin slightly convex.

Tail depressed, with a broad lateral fold; dorsal fins comparatively

large; caudal fin well developed; under side of tail flattened with a blunt medial ridge.

Under side covered with a fine shagreen, like the skin of a shark, the roughnesses being triangular and closely set, depressible backwards; the skin below much as in *Rhinobatus*, but the prickles higher and sharper, the skin much rougher than in the latter genus.

The branchial region, from the nostrils to the pelvic bones, is entirely smooth, except the lower lip, which has a band of close-set prickles. A small tract in the middle of the pelvic area is prickly, and most of the abdomen proper, back to a point in front of the vent; the anterior and outer three-fourths of the pectorals below and about half the ventrals anteriorly and exteriorly also rough, as is the whole snout below, in front of the nostrils; whole lower surface of the tail and the surface of the fins rough with shagreen.

Above, the entire surface is covered with close-set stellated prickles of different sizes, largest on the base of the pectorals, and smallest about the eyes and on the outer edges of the fins.

Besides these are several stout, bluntish, slightly recurved spines, with stellate bases, placed as follows: One at the upper anterior angle of the eye and two behind it, the posterior the larger; a large spine on the back at the shoulder-girdle, in front of which are two or three on the median line, and a series on the middle line of the back of 10 to 12; two more on the tail between the dorsal fins; two series on the shoulder-girdle, the inner of two, the outer of two to four. No other large spines on the body. No claw-like spines are present on the pectorals in the male examples seen, all of which are, however, immature.

*Measurements.*

Total length.....	8.4 inches.
Length of disk, to root of ventral.....	4.4 inches = .51 of total.
Breadth of disk.....	.51 "
Length of tail.....	.49 "
Snout to scapular spine.....	.295 "
Eye.....	.05 "
Snout.....	.11 "
Interorbital space.....	.055 "
Scapular spine to first dorsal.....	.31 "
Length of first dorsal.....	.045 "
Height of first dorsal.....	.095 "
Distance between dorsals.....	.075 "
Length of caudal fin below.....	.15 "
Width between nostrils.....	.12 "
Width of mouth.....	.095 "
Snout to vent.....	.46 "
Width of branchial area.....	.225 "
Length of branchial area.....	.085 "

This species is very abundant in the Bay of San Diego, where about twenty examples of both sexes, all very similar in size, were obtained.

This species of the Asiatic genus *Platyrrhina* in the waters of the United States is a very interesting addition to our fauna.

## RHINOBATIDÆ.

53. *Rhinobatus productus* Ayres.

Very common.

## GALEORHINIDÆ.

54. *Mustelus californicus* Gill.

Abundant. This species appears to be identical with the Atlantic *Mustelus canis*, itself indistinguishable from *Mustelus hinnulus* Blainville, of the Mediterranean.

55. *Triacis semifasciatus* Grd.

Not uncommon.

56. *Galeocerdo* sp?

The jaws of a large shark, with the teeth similar in both jaws, triangular, oblique, deeply notched on the outer margin, and all strongly serrate, are preserved by Mr. Pitcher, of San Diego. The shark was taken near San Diego, but south of the Mexican line. The width of the mouth is about a foot. I suppose this to have been a species of *Galeocerdo*.

## HETERODONTIDÆ.

57. *Heterodontus francisci* (Grd.) Jor. & Gilb.

Common.

DESCRIPTION OF A NEW FLOUNDER (*XYSTREURYS LIOLEPIS*),  
FROM SANTA CATILINA ISLAND, CALIFORNIA.

By DAVID S. JORDAN and CHARLES H. GILBERT.

## XYSTREURYS LIOLEPIS, gen. et sp. nov.

GENERIC CHARACTERS.—Subfamily *Hippoglossinae*, allied to *Hippoglossina*, *Hippoglossoides*, and *Paralichthys* (*Pseudorhombus*). Eyes and color on the right side; mouth large, oblique, with the teeth developed on both sides, stout, unequal, bluntish, in a single series; gill-rakers few, short, thick, almost triangular; scales small, cycloid, membraneous, oblong in form; lateral line simple, arched over the pectorals; caudal fin double-truncate, the angles rounded; dorsal fin beginning over the eye; anal fin preceded by a feeble antrorse spine; ventrals lateral; body oblong, moderately deep, rather thin.

This genus differs from *Hippoglossoides* in the arched lateral line, and from *Hippoglossina* in the cycloid scales and in its dextral habit. From most of the related genera it is separated by the few stout short gill-rakers.

**SPECIFIC CHARACTERS.**—Form broadly elliptical, the profile continuous with the curve of the back; ventral outline from chin to past the ventrals nearly straight, the rest of the outline corresponding to the dorsal outline. Head moderate, shortish; mouth very oblique, not so large as in *Paralichthys maculosus*; the premaxillaries on the level of the pupil when the mouth is closed, the maxillary reaching to the posterior border of the eye; maxillary broad; teeth in a straight row, wide apart, unequal, conical, and blunt at tip, their number about  $\frac{14+15}{13+12}$ . Teeth in the lower jaw irregularly alternating large and small. In the upper jaw similar, but smaller and less obviously alternating. The middle tooth on the blind side in the upper jaw the largest.

Eyes large, close together, the lower slightly anterior; nostrils of right side above and in front of lower eye; upper nostrils turned over on the blind side; posterior nostrils largest, with a conspicuous flap. Interorbital space a narrow, elevated ridge, covered with very small scales; a few scales on the posterior part of the maxillary, none on the mandible.

Preopercle with its posterior margin free, little movable; cheeks and opercles densely covered with small, oblong, cycloid scales. Branchiostegals 7.

Gill-rakers short, blunt, triangular, scarcely one-fourth as long as the eye, their edges slightly dentate. There are about 7 of the large ones on the middle and lower part of the gill-arch, some rudiments above. (There are about 24 long and slender gill-rakers in *Paralichthys maculosus*.)

Lateral line without dorsal branch, with a broad curve above the pectorals. Scales quite small, oblong, cycloid, thin and membranous; little imbricated except behind, and somewhat imbedded in the skin, with some smaller supernumerary scales, especially below; scales much smaller on the thoracic region than on the sides. Scales of right and left sides similar. A series of small scales extending up each ray of the vertical fins.

Lateral line with about 123 scales, pierced by tubes; number of rows of scales perhaps a little greater than the number of tubes.

Dorsal fin beginning just in advance of the middle of the pupil, its first ray slightly turned toward the blind side; some of the anterior rays pinate; most of the rays simple; the fin rather low in front, gradually becoming higher to a point near the middle of the body, thence regularly diminishing behind, the last ray being near to the base of the caudal; the caudal peduncle very short; anal fin similar, its highest ray opposite the highest of the dorsal; a weak antrorse spine at beginning of anal; ventrals shortish, reaching past front of anal; pectoral of right side about as long as head, that of left side half as long. Caudal fin somewhat double-truncate, with rounded angles, the middle rays being produced.

Fin-rays: Dorsal, 82; anal, 64; ventrals, 7.



*Measurements of typical specimen.*

(No. —, United States National Museum.)

Extreme length.....	11.50 inches.
Length to base of caudal fin .....	9.90 inches = 1.00
Greatest depth .....	.41
Least depth.....	.105
Length of caudal peduncle .....	.065
Length of head .....	.23
Width of interorbital area.....	.017
Length of snout.....	.04
Length of maxillary.....	.10
Length of mandible.....	.11
Diameter of orbit .....	.065
Distance from snout to dorsal.....	.075
Length of base of dorsal.....	.77
Greatest height of dorsal.....	.10
Distance of anal from snout .....	.32
Length of base of anal.....	.69
Height of longest ray.....	.11
Length of caudal.....	.13
Length of pectoral (right side).....	.24
Length of ventrals.....	.085

The typical example of this species was taken on a hook on the west side of the island of Santa Catalina, Los Angeles County, California.

**DESCRIPTION OF A NEW RAY (PLATYRHINA TRISERIATA), FROM  
THE COAST OF CALIFORNIA.**

**BY DAVID S. JORDAN AND CHARLES H. GILBERT.**


**PLATYRHINA TRISERIATA.**

Disk broad-ovate, broader than long; the snout very bluntly rounded, not projecting; the angle formed anteriorly by the pectorals very obtuse; anterior margins of the pectorals slightly convex; tail stout, in form intermediate between *Raia* and *Rhinobatus*, its width at base about equal to the length of the snout and a little more than the interorbital width; tail much longer than the disk, not much depressed, its sides vertical, its lower lateral edges with broad horizontal fold, a slight groove above on each side of the median series of spines.

Dorsal fins similar, higher than long, the anterior far behind the end of the claspers; the posterior free margin of both fins very convex, not forming an angle. Caudal fin large, well developed both above and below, its outline entire, elliptical. Ventral fins with their margins entire, the claspers well developed. Pectoral fins extending forward to a point but little short of the tip of the snout.

Rostral ridges wide apart at base, rapidly convergent, inclosing a triangular area; a slight translucent space separates this from the opaque pectorals; eyes small, wide apart, the broad spiracles close behind them.



Mouth broad, its width equal to the distance from its front margin to the tip of the snout; a deep crease passing around the mouth behind, in front of which the lower lip has three folds of skin. Upper lip not developed, a strong fold of skin passing from the angle of the mouth on either side to the inner angle of the nostrils, thence straight across, joining its fellow on the opposite side, these folds enclosing a depressed, subtriangular, -shaped area, which is bounded behind by the curved outline of the upper jaw. In this depression are three transverse cross-folds of skin. Nostrils broader than the interval between them, with a free fold behind, which is prolonged forwards and inwards in the middle, the rest of the fold being turned backward. Anterior edge of nostrils with a broad flap, the outer edge of which is much prolonged, overlapping the posterior flap, the inner edge covering the inner angle of the nostril.

Both jaws strongly and somewhat regularly curved. Teeth numerous, rather sharp, about  $\frac{60}{56}$ , about twelve in a cross-series. Gill openings very narrow.

Skin everywhere covered with a rather fine shagreen, almost precisely as in *Rhinobatus productus*. The asperities are smaller below, and coarser on the outer anterior margin of the pectorals, where there are also two or three irregular rows of sharp, curved, backward-directed spines. Four strong spines on the tip of the snout, forming a rhombic figure; four or five strong, bluntish spines around each eye, above and in front, the one at the upper anterior angle the largest.

A series of 22 very strong spines along the median line of the back and tail, and two more on the tail between the dorsal fins. On each side of the tail above is a similar series of ten spines, the first opposite the end of the base of the ventrals, the last opposite the front of the first dorsal; a single strong spine on the outer edge of the shoulder-girdle and two between the spine and the dorsal series.

Color almost exactly as in *Rhinobatus productus*. Olive-brown above, whitish beneath, the vertical fins paler. Rostral area and edges of pectorals somewhat translucent. No sharp markings of any kind anywhere.

*Measurements.*

Extreme length .....	17.90 inches.
Length of disk.....	7.25 inches = 1.00
Width of disk.....	1.09
Width of tail at base.....	.20
Distance between outer humeral spines .....	.36
Length of branchial area.....	.15
Width of branchial area in front.....	.34
Width of branchial area behind.....	.28
Distance between outer edges of nostrils.....	.21
Width of mouth .....	.20
Width of interorbital area.....	.165
Length of eye.....	.06
Length of snout from eye .....	.225

Length of snout from mouth.....	.22
Length of nostrils.....	.07
Width of anterior nasal flap.....	.06
Length of nasal flap.....	.04
Distance from snout to first dorsal.....	1.565
Length of base of first dorsal.....	.095
Height of first dorsal.....	.18
Interval between dorsals.....	.155
Length of second dorsal.....	.10
Height of second dorsal.....	.19
Height of caudal.....	.175
Length of upper portion of caudal.....	.455
Distance from snout to end of base of pectoral.....	.83
Length of base of ventrals.....	.28
Width of ventrals.....	.20
Length of claspers.....	.36

The type of this species, an adult male, was taken at Santa Barbara, Cal., February 8, 1880, by A. Larco, an Italian fishermen. It is numbered——in the collection of the United States National Museum. Mr. Larco states that this species is not uncommon about Santa Barbara in spring and summer.

This species is probably related to *Platyrrhina sinensis*, but it has little affinity with *Platyrrhina exasperata*, already described by us, from San Diego. In color, form of tail, and character of the dermal covering it resembles the *Rhinobatidae*, and its affinities with *Syrrhina*, of the latter "family," are evident.

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**DESCRIPTION OF A NEW SPECIES OF "ROCK COD" (SEBASTICH-  
THYS SERRICEPS), FROM THE COAST OF CALIFORNIA.**

**By DAVID S. JORDAN and CHARLES H. GILBERT.**

Body rather robust, heavy forwards, compressed behind, the caudal peduncle short and rather slender. Head large. Mouth large, rather oblique, the maxillary reaching to opposite the middle of the eye; the premaxillary anteriorly on the level of the orbit; jaws about equal, in the closed mouth; teeth, as usual, in villiform bands on the jaws, vomer, and palatines.

Top of head with the spinous ridges very thick and strong, their tips bluntish, turned upward and outward; the spines on each side placed nearly in a right line, so that the edge of the crown seems somewhat regularly serrated.

The following pairs of spines are present: nasal, preocular, supraocular, tympanic, occipital, and nuchal. The coronal spines (found in *S. auriculatus* and *S. ruber*) are wanting in this species, as are the postocular spines (usually present in *S. pinniger*). Interorbital space between the spines narrow, flat, and coarsely scaled (the elevated ridges found in *S. nigrocinctus* being wanting). The tympanic spines are

stronger than in related species. The nuchal spines are as usual placed close behind the occipital.

Preorbital bone rather broad, with a single obsolete spine directed downward. Preopercle with five rather short and bluntish spines, the second the larger, the three lower quite small. Opercle with two bluntish, diverging spines. A blunt spine on the shoulder girdle above the pectorals; two sharp suprascapular spines. Subopercle and lower edge of opercle each with a blunt point. Preorbital scaly below. Maxillary naked.

Eye rather large, its diameter about one-quarter the length of the head.

Gill-rakers clavate, short, stiff, compressed, armed with bristly teeth above and within. There are about thirty of them in all, those nearest the middle of the arch longest and most perfect, the others gradually growing smaller and incomplete. About half of them have the posterior edge free. The longest is about one-third the length of the eye ( $\frac{1}{6}$  in *S. melanops*;  $\frac{2}{3}$  in *S. pinniger*). In form they are midway between the tubercle-like gill-rakers of "*Sebastomus*" (*S. melanops*) and the long and slender gill-rakers in "*Sebastomus*" (*S. pinniger*, *flavidus*, *auriculatus*, etc.).

Branchiostegals 7, the gill membranes, as in other species, little united, without isthmus.

Scales moderate, essentially as in *S. fasciatus* and related species. Lateral line with 55 scales.

Dorsal fin with strong spines, the fourth to seventh highest and subequal, the lowest more than half the height of the highest. Soft dorsal rather higher than any of the spines. Caudal fin broad, rounded. Anal fin with the second spine robust, about as long as the third and much stronger, the soft rays high.

Pectoral broad and rounded, its base deep, nearly one-third the length of the head, its lower rays thickened as in *S. melanops*, its tips reaching just past the vent. Ventrals falling just short of the front of anal.

Fin rays: D. XII, 1, 13; A. III, 5.

General color dark olive, blackish on the head and back, the sides somewhat yellowish; sides of body with black cross-bands which are somewhat oblique; these bands are usually distinct, but are sometimes nearly obsolete in dark-colored examples. The first band runs downward from front of dorsal across base of pectoral; the second from near the middle of spinous dorsal to behind the ventrals; the third from the posterior part of the dorsal to the vent; the fourth and fifth above the anal, and the sixth at base of caudal. Another black bar extends across the scapular region and the opercular spines, and two bands radiate from the eye, obliquely downward and backward. Belly dusky greenish; fins blackish, with a strong olive tinge.

Lips, mouth, *front and lower part of the head*, with a strong wash of

coppery *red*, this color fading out on the thoracic region. Base of fins and different parts of the body sometimes with obscure small whitish spots.

*Measurements.*

(No. ———, United States National Museum, from Santa Barbara.)

Extreme length .....	10.40 inches.
Length to base of caudal .....	8.70 inches = 1.00
Greatest depth .....	.38
Least depth .....	.11
Length of head .....	.35
Diameter of eye .....	.085
Length of snout .....	.10
Width of interorbital area .....	.055
Length of supraocular ridge .....	.05
Length of occipital ridge .....	.06
Length of maxillary .....	.18
Distance from snout to dorsal .....	.325
Length of base of dorsal .....	.57
Height of longest spine .....	.13
Height of longest ray .....	.155
Length of base of anal .....	.135
Height of second spine .....	.14
Height of longest ray .....	.22
Length of caudal .....	.205
Width of base of pectoral .....	.11
Length of pectoral .....	.265
Length of ventral .....	.24

This species is found in great abundance about the island of Santa Catalina, where eight examples were obtained by the writers. Another was taken at Santa Barbara, where the species is considered rare by the fishermen. It seems to be intermediate between the still rougher-headed *S. nigrocinetus*, on the one hand, and the smoother *S. fasciatus* and *S. melanops* on the other.

ON THE OCCURRENCE OF CEPHALOSCYLLIUM LATICEPS (DUMÉRILO) GILL, ON THE COAST OF CALIFORNIA.

By DAVID S. JORDAN and CHARLES H. GILBERT.

While we were engaged in making collections on the coast of Los Angeles County, California, a shark was described to us by a Wilmington fisherman as having the habit when caught of filling himself with air "till he was big as a barrel," so that if thrown back in the water he would float away on the surface, belly upward, etc., exactly after the fashion of the species of *Tetrodon*. On cross-questioning, the fisherman assured us that the animal was a genuine shark, with the mouth underneath and many sharp teeth, and that he had frequently taken them near Wilmington.

At last one of these animals was brought in to us by a fisherman



named Vicente Leonardo, who took it in a gill-net off Santa Catalina Island. It proved to be a species of the genus *Cephaloscyllium* Gill, and apparently identical with the type of the genus (*Scyllium laticeps* Duméril). This species has been hitherto recorded, so far as we know, only from Tasmania.

The following is a description of our specimen (No. ———, United States National Museum):

Head short and broad, broader than long, and not half as deep as broad; snout very blunt, not projecting much beyond the mouth; eyes oblong, small, the spiracles behind them well developed; no nictitating membrane; nasal openings not confluent, their flaps separated by a broad space, the breadth of which is two-thirds the length of the snout; nasal flaps conspicuous, without cirrus; mouth very broad, not strongly curved, with only a trace of labial fold at the angle; skin at the angle of the mouth thin, smooth, pale, and raised into little cross-folds.

Teeth similar in both jaws, small, sharp, with a long central cusp and a small basal cusp on each side. About four series of teeth. Teeth  $30 + 30$   
 $27 + 27$

First dorsal beginning over middle of ventrals; second dorsal beginning behind front of anal and ending a little before end of anal; base of pectorals low and horizontal, the last two gill openings above them. Caudal fin short.

Color dark grayish-brown, with five pairs of dark bars across the back, their form irregular; the central pair bounded by straight lines and forming a cross-shaped figure; middle part of each fin blackish; entire surface of body and fins covered with round black spots of different sizes, these larger and less numerous on the belly; on the sides are also whitish spots, smaller and less numerous than the black ones.

This specimen was a female, with the ova nearly ripe. The stomach when received by us was much inflated. The intestines contained numerous specimens of a small gasteropod shell.

Other fishermen about Wilmington tell me that they take this shark occasionally, about two or three times a year, and that when fully inflated it is half as broad as long, a statement not hard to believe.

A fisherman at Santa Barbara, Mr. A. Larco, tells me that he also knows this shark. He has in his possession two egg-cases, with the eggs, which he says were taken from one of this species. These egg-cases are "wheel-barrow shaped," like the egg-cases of rays, and provided with long tendrils.

#### Measurements.

Length .....	37 inches = 1.00
Greatest depth (partly distended).....	.22
Greatest width (partly distended).....	.25
Length of head.....	.15
Greatest width of head .....	.18
Length of snout (from mouth) .....	.04
Length of branchial area .....	.08



Width of mouth.....	.14
Diameter of eye .....	.03
Distance from snout to first dorsal .....	.62
Length of base of first dorsal.....	.08
Distance between dorsals.....	.09
Length of base of second dorsal.....	.05
Height of second dorsal.....	.065
Length of base of anal.....	.065
Height of anal .....	.08
Length of caudal.....	.18
Length of pectoral .....	.21
Length of ventral .....	.11

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**ON THE OIL-SHARK OF SOUTHERN CALIFORNIA (GALEORHINUS GALEUS).**

**By DAVID S. JORDAN and CHARLES H. GILBERT.**

Along the coast of Southern California a large species of shark appears in the spring in great schools. At certain places along the coast, especially about Newport Landing, in the southern part of Los Angeles County, the pursuit of this shark becomes a matter of considerable economic importance. They are taken easily with a hook, and sometimes great numbers of them may be surrounded and brought in with a seine. They are valued for their livers and fins. A single liver when the animals first arrive, in March, will yield a gallon of oil. As much as 4,000 gallons of this oil have been procured at Newport in a single season. The fins of this species are sold to the Chinamen, who find them a great delicacy, and pay for them 12½ cents a pound.

The present writers have succeeded in obtaining one of these "oil-sharks," and find the species to be the European tope, *Galeorhinus galeus* (*Galeus canis* and *vulgaris* of authors). It is singular that our only knowledge of the occurrence of this species on the west coast of America till now has been the indication by Dr. Günther of the presence in the British Museum of "*G. Young*. San Francisco. From Mr. Gruber's collection." Yet, in the waters of California south of Point Conception it is doubtless more numerous in individuals than all other species of sharks combined.

*Measurements of an adult male oil-shark.*

Length.....	63 inches = 1.00
Depth (greatest) .....	.14
Length of head .....	.18
Length of snout (below, from mouth) .....	.075
Length of snout (from eye) .....	.08
Width of mouth.....	.07
Length of spiracle.....	.0075
Diameter of eye .....	.025
Distance from snout to first dorsal.....	.33
Length of base of first dorsal.....	.073

Height of first dorsal .....	.075
Distance between dorsals.....	.25
Length of second dorsal .....	.045
Height of second dorsal .....	.04
Length of anal .....	.035
Length of caudal.....	.21
Distance from ventrals to pectorals .....	.25
Length of pectorals.....	.15
Length of ventrals.....	.045

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**THE SURF-SMELT OF THE NORTHWEST COAST, AND THE METHOD OF TAKING THEM BY THE QUILLEHUTE INDIANS, WEST COAST OF WASHINGTON TERRITORY.**

**By JAMES G. SWAN.**

NEENAH BAY, WASH., *September 22, 1879.*

Thirty miles south of Cape Flattery, at the entrance to Fuca Strait, Washington Territory, is the Quillehute River, a small stream emptying into the Pacific Ocean near some rocky islets, the largest of which, named by the Indians "Alikistet," and by the whites "James Island," is a landmark for the entrance to the little bay or cove, on the shore of which is the principal village of the Quillehute Indians, who collect and dry for winter use a very choice variety of smelt (*Hypomesus olidus*), which I have named the surf-smelt, from its peculiar habit of depositing its spawn among the shingle of the beach, coming in with the surf in incredible numbers, and in this respect somewhat resembling the capelin (*Mallotus villosus*) of New Brunswick.

The surf-smelt closely resembles the common smelt in shape, size, and the peculiar cucumber-odor, but differs in having its belly covered with a coating of yellow fat, which imparts an oily appearance to water where the fish have been cleaned or washed, and makes them the very perfection of pan-fish.

During the month of August, 1879, I was at the Quillehute Indian village from the 17th to the 22d, with United States Indian Agent Charles Willoughby, and had an ample opportunity to witness the habits of the surf-smelt and their capture by the natives. These Indians take them by means of a peculiar-shaped hand-net of a parallelogram form at top, five feet long, twenty inches wide, and from four to five feet deep, with a curved handle.

The specimen net which I send is made of the fiber of the common stinging nettle (*Urtica dioica* L.), which grows in luxurious abundance on the northwest coast near Indian villages and deserted camps. A specimen of the prepared fiber is also sent with the net.

The method of preparing the nettle by the Quillehute Indians, after gathering a quantity and stripping off the leaves and twigs, is to dry the stalks in the sun or on a frame in the lodge, near, but not directly over, the fire.

When properly dried, each stalk is split open and the *shive* or woody part broken by the hand and peeled off from the outside skin or fiber. This fiber is then spun or twisted into threads or twine, by rolling between the palm of the hand and the bare leg, a process at which the women are very expert.

The Indians at present know nothing of the process of rotting the plant and breaking it to get rid of the *shive*, or of the process of hackling the fiber, and as their method is so slow and laborious, they are abandoning the use of the nettle as a textile plant, and use twine, which they either purchase ready made, or manufacture from cotton threads raveled out from flour-sacks and spun by hand, or from jute, which they procure from old gunny-bags which have been thrown away by the whites.

I think if they could be taught the process of rotting the nettle and preparing the fiber as the farmers of Kentucky prepare hemp or flax, that they would soon be able to furnish a valuable article of commerce which would pay them well for their labor.

The net I send will show the twine made by this most primitive of all methods, and indicate the many purposes for which it may be made available, but in order to be profitable it should be prepared in quantities like flax, or hemp, which it greatly resembles.

The net stitch or knot for making the mesh was not taught them by white men, but has been known by the coast Indians for ages.

Nearly thirty years ago I saw the salmon-nets of the Chinook Indians at the mouth of the Columbia River. The knowledge and use of nets antedates the advent of the first white man, but in the manufacture of the fiber and the twine they seem to have retained the most primitive ideas, and never have advanced. What little twine they now manufacture is made exclusively by the old women.

The peculiar shape of the net, and the curved handle, are to enable Indians to best use them in the surf. A straight handle could not be used.

The surf-smelt are usually most plentiful during the month of August, and come in such vast numbers that the water seems to be filled with them. Captain Carroll, of the steamer Alexander Duncan, plying between the Columbia River and Puget Sound, informed me that, on the 24th of August, while on his passage from Astoria to Neenah Bay, he ran through a school of smelts between Point Grenville and Quillehute which extended nearly forty miles, and at night their track was made visible by a bright phosphorescent light which emanated from them. I noticed the same luminous appearance in the surf in Quillehute Cove during each night that I remained there.

The smelts come in with the flood tide, and when a wave breaks on the beach they crowd up into the very foam, and as the surf recedes many will be seen flapping on the sand and shingle, but invariably returning with the undertow to deeper water.

An examination showed the pebbles to be incrustcd with spawn, and as all the smelts I cooked were males, I concluded that the females had first come in and cast their spawn and were succeeded by the males, who deposited their milt. I handled and noticed a great many, and cooked several dozens on two successive days, but did not notice a single female. This might have been purely accidental, and perhaps at another time the catch would have proved all females.

On the first appearance of the fish, the Indians rush into the surf and press the outer edge of the net down firmly on the sand or shingle, the swash of the breaker forcing the smelts into the net. Then, as the water recedes, they turn round quickly and hold the net so that the undertow will force more smelts into it. In this way I saw them take at least a bushel at a single scoop.

In their immense numbers, these smelts resemble the eulachon, (*Osmerus pacificus*) or candle-fish, which are taken in such enormous quantities at Nass River, in British Columbia, near the southern boundary of Alaska.

After every scoop, the Indian, if successful, empties its contents on the beach, where the squaws and children quickly gather them into baskets, and carry them to the houses, where they are strung on strips of cedar bark and hung up to dry. The method of stringing them is to take each one separately and pass a half hitch with the bark around the head just back of the gills. This keeps each fish separate, and enables them to dry better.

The Quillehutes still retain the ancient superstition, formerly so prevalent among the coast tribes, relative to their fish, that the first ones must not be sold or given away to be taken to another place, nor must they be cut transversely, but split open with a muscle-shell.

I was fortunate in obtaining quarters in the house of an Indian who had a cooking-stove, where we cooked our rations as suited us. One of the Indians of our party obtained some smelts, which he boiled for supper, cooking them in the Quillehute style; he gave me some, which I fried. No sooner did the Quillehutes learn that I was cooking some of their fish than two of the head chiefs, Howeattl and Klakistokar, came to see what I was doing, as they feared I would cut the fish with a knife; but I fried them whole, and when they saw me take the nice crispy smelts with my hand and eat them entire, without aid of knife or fork, they grunted forth their satisfaction, and allowed me to purchase as many as I wished to take away. But of salmon they would neither give or sell. The fall run of the *Salmo canis* and *Salmo proteus* had just commenced to come, and while they gave us all we could eat of their own cooking, in their own houses, they refused to sell or give a single fish to be taken away. They fully believed that if we took any salmon into our canoe, all the salmon would desert the Quillehute River and follow us to Neeah Bay, and if we had cut the smelts or salmon with a knife, they all would immediately disappear in the ocean and never return.



I was unable to procure even a specimen of the salmon, but obtained enough smelts to forward some excellent specimens to Washington.

Very respectfully, your obedient servant,

JAMES G. SWAN.

Prof. SPENCER F. BAIRD,

*United States Commissioner Fish and Fisheries,*

*Smithsonian Institution, Washington, D. C.*

P. S.—I omitted to mention that the surf-smelt are common in all the salt water of Puget Sound, but I have not heard of an instance where they run up fresh-water streams to spawn, like the eastern smelt.

J. G. S.

#### NOTE ON THE OCCURRENCE OF *PRODUCTUS GIGANTEUS* IN CALIFORNIA.

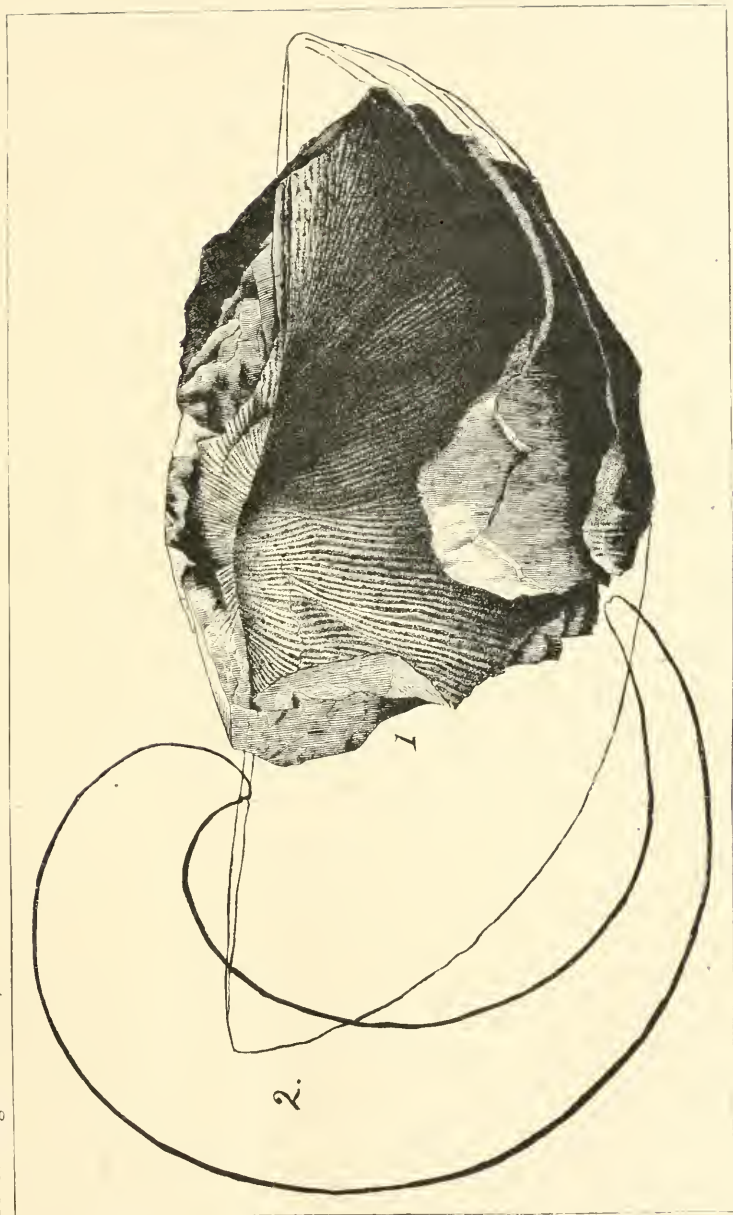
By C. A. WHITE.

Among a small collection of fossils sent to the National Museum by Mr. Ludwig Kumlén, of the United States Fish Commission, from the valley of McCloud River, Shasta County, California, are three or four large examples of *Productus*, which I am unable to distinguish from *P. giganteus* Martin sp., the well-known type species of the genus as it is extensively known in European strata. They are preserved in a hard, dark-colored, argillaceous rock, which is partly metamorphosed, and they are, therefore, somewhat imperfect; but portions of them show the characteristics of the species very plainly. The largest of these Californian examples was, when perfect, quite equal in size to the larger European examples of *P. giganteus*, having had a transverse diameter near the hinge of not less than 140 millimeters, or 5½ inches.

A small collection of fossils was sent by mail from the same locality in 1877 by Mr. Livingston Stone, the species of which were recognized as of Carboniferous age, but *P. giganteus* was not among them, although the later collections indicate that they occur in the same strata. These associated forms of both collections are too imperfectly preserved for specific determination, but the genera *Fenestella*, *Streptorhynchus*, *Spirigera*, *Camarophoria*, *Allorisma*, and *Euomphalus* are more or less satisfactorily recognized. They all together plainly indicate the Carboniferous age of the strata from which they come, which fact was also previously known through the reports of Trask and Whitney.

This, so far as I am aware, is the first discovery of *P. giganteus* in American strata. It is not a little remarkable that it should be found in the western portion of the continent and not in the middle and eastern portions, where the Carboniferous system is so well developed, and where several European species of Carboniferous brachiopoda are recognized.





PRODUCTUS GIGANTEUS.



Fig. 1, on Plate —, represents one of the examples referred to, the principal portion of the figure showing a natural cast of the dorsal valve, with the umbonal portion of the ventral valve. In this figure the full length of the shell from back to front is not shown, but it is represented in the accompanying diagram, Fig. 2.

WASHINGTON, D. C., December 3, 1879.

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NOTE ON ACROTHELE.

By C. A. WHITE.

Among the fossils collected from Primordial strata at Antelope Spring, Southern Utah, by Mr. G. K. Gilbert and Mr. E. E. Howell, who were then connected with the explorations and surveys west of the 100th meridian, were a number of examples of a discinoid brachiopod. This form I described and figured\* under the name of *Acrotreta? subsidua*, referring it to that genus provisionally. None of the examples were in a condition to show all the generic characters clearly, but certain features in these shells indicated their possession of important differences from any genus then established and led me to suggest that they probably represented a new generic type. In the same year, 1876, Prof. G. Linnarsson, of Stockholm, Sweden, published† a new generic form from the Primordial rocks of Sweden, under the name of *Acrothele*, which plainly includes *Acrotreta? subsidua* White. Professor Linnarsson described two Swedish species under this generic name (*A. coriacea* and *A. granulata*), and in 1879 he published a third species under the name of *A. intermedia*,‡ but *A. subsidua* is at present the only known American species. It is not unlikely, however, that some of the American species heretofore referred to *Discina* will be found to belong to *Acrothele*.

WASHINGTON, D. C., February 1, 1880.

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DESCRIPTION OF A NEW CRETACEOUS PINNA FROM NEW MEXICO.

By C. A. WHITE.

*Pinna stvensoni*.

Shell large, elongate-triangular in marginal outline; valves moderately convex; the convexity being slight and nearly uniform posteriorly, but much greater toward the front, where it amounts to an obtuse median angularity upon each valve, and where a transverse section of the shell has an approximately regular rhombic outline; upper border

\* Expl. and Sur. West of the 100th Merid., Vol. IV, p. 34, pl. I, fig. 3, *a*, *b*, *c*, and *d*.

† Bihang till k. Svenska Vet. Akad. Handlingar, Band 3, No. 12, p. 30, pl. IV, figs. 44-52.

‡ Sveriges Geologiska Undersökning; Ser. C. Afhand. och Upps. No. 35, p. 25, pl. iii, figs. 40-44.

straight or nearly so; lower border slightly convex and longer than the upper border; posterior border nearly straight or slightly convex, truncating the shell obliquely downward and backward, meeting the upper border at a more or less distinct obtuse angle and the lower border by an abrupt curve. Surface marked by abundant coarse lines and imbrications of growth, which traverse the shell in slightly curved lines corresponding with the posterior border, and is apparently without trace of any radiating lines or ribs.

Entire length from beak to postero-basal extremity about 215 millimeters; breadth, from the postero-dorsal extremity to the base, measured at right angles with the upper border, 95 millimeters.

This shell is so unlike any described American species that no detailed comparison with any of them is necessary; but it is so closely related to *P. legeriensis* d'Orbigny, from the department of Sarthe, France, that it is not without some hesitation that I have decided to propose a separate specific name. I have never had an opportunity to examine any of the few examples of *P. legeriensis* that have been discovered, and my comparisons are therefore only with the description and figures of d'Orbigny, in Pal. Française, Vol. III, p. 257, pl. 334. From these it appears that our shell differs from *P. legeriensis* in the following particulars. The angle of divergence of the upper and lower margins is not so great, in consequence of which the breadth of the shell is not proportionally so great; the curve by which the posterior border meets the lower border is more abrupt, and the greatest transverse diameter of the shell is near the median line instead of being much below it, as it is represented to be in *P. legeriensis*. The internal median grooves upon each valve, and also the undulations of the lower border, mentioned by d'Orbigny, appear to be entirely wanting in our shell.

*Position and locality.*—Cretaceous strata; about  $1\frac{1}{2}$  miles southward from Fort Wingate, Northern New Mexico, where it was collected by Mr. James Stevenson, in whose honor the specific name is given.

WASHINGTON, D. C., February 15, 1880.

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**NOTE ON THE OCCURRENCE OF STRICKLANDINIA SALTERI AND  
S. DAVIDSONI IN GEORGIA.**

**By C. A. WHITE.**

A few months ago Lieut. A. W. Vogdes, United States Army, gave me a few fragmentary fossils from a collection which he had then lately made at Taylor's Ridge, in the town of Ringgold, Catoosa County, Georgia. The other fossils of this collection and the geology of the region referred to were discussed by Lieutenant Vogdes in the December, 1879, number of the American Journal of Science and Arts, pp. 475-477. He there refers, and doubtless correctly, the horizon from which he obtained the fossils he gave me to that of the Clinton Group

of New York. They are in the condition of natural casts in fine-grained sandstone, but I have quite satisfactorily identified a dorsal valve of *Stricklandinia salteri* and one of *S. davidsoni* Billings. If these two species are correctly identified, as they appear to be, their discovery in Georgia is especially interesting, because they have hitherto been found only in strata of the island of Anticosti; and also of the indication which they and their associates in the two regions named afford as to the equivalency of the Georgia, Clinton, Anticosti strata in America; and Upper Llandovery strata of Great Britain.

WASHINGTON, D. C., February 15, 1880.

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**DESCRIPTION OF A NEW FLOUNDER (PLEURONICHTHYS VERTICALIS), FROM THE COAST OF CALIFORNIA, WITH NOTES ON OTHER SPECIES.**

**By DAVID S. JORDAN and CHARLES H. GILBERT.**

*Pleuronichthys verticalis* sp. nov.

Form broad ovate, the outlines regular; head small, somewhat constricted behind the upper eye; eyes large, but smaller than in *P. quadrifasciatus*. Interorbital ridge narrow; a small tubercle or prominence in front of the upper eye; a large one in front of upper edge of lower; another larger and sharper at interior edge of the interocular space; another at the posterior edge of the interocular spine ridge. This latter is developed into a long, sharp, triangular spine, which is nearly as long as the pupil, and is directed backwards. A prominent tubercle at the posterior lower angle of the upper eye. Upper edge of opercle somewhat uneven, but no other tubercles present.

Mouth small, as in other species; the lips thick, with lengthwise plicæ.

Teeth in a broad band on the left (blind) side of each jaw; *no teeth on the right side in either jaw*. Gill-rakers very small, weak, and flexible, about ten in number. Scales essentially as in the other species, small, cycloid, imbedded, and scarcely imbricated. Lateral line nearly straight, with an accessory branch which extends to the middle of the dorsal fin.

Dorsal fin beginning on the blind side at the level of the premaxillary, there being but about four of its rays on the left side of the median line. Vertical fins less elevated than in the other species, the longest rays of the dorsal about half the length of the head. Anal fin preceded by a spine. Caudal peduncle short and deep. Caudal fin elongate, rounded behind. Pectoral short, nearly equal. Ventrals moderate, reaching anal spine.

Fin rays: D. 65; A. 45.

Color dark olive-brown, with round grayish spots, the body and fins mottled with blackish.



The type, No. ———, United States National Museum, was taken in a trawl-net outside of the Golden Gate, and was procured by us in the San Francisco market.

There are apparently three species of the genus *Pleuronichthys*, as restricted by Gill, in the waters of California.

One of these is the common species in the San Francisco markets at present, being taken in some abundance in the trawl-nets off Point Reyes and the Farallones. This species is the *Pleuronichthys cænosus* of Lockington's Memoir (Proc. U. S. Nat. Mus. 1879, 97), and, as Lockington suggests, it is probably identical with the *Pleuronectes quadrituberculatus* of Pallas. For this form we accept provisionally the name *quadrituberculatus*.

A second species occurs farther south, two specimens having been procured by us at Santa Catalina Island, and one at San Luis Obispo. This form answers better than the preceding to Girard's description of his *Pleuronichthys cænosus*, and it may for the present be identified with it. The specimen noticed by Lockington as "No. 4," "with the dorsal not continued downward nearly so far as the others," perhaps belongs to this species.

The third species is *P. verticalis*, described above.

The species may be readily separated, so far as we have observed, by the following characters:

\* Dorsal fin beginning on the level of the lower lip, about ten of its anterior rays being on the left side; ocular region with four or more blunt prominences or tubercles, arranged as follows: one in front of upper eye, another at each end of the interorbital ridge, the posterior largest, but not spine-like, one behind the latter, and one or two more behind the upper eye; upper part of opercle uneven; lower jaws with a band of teeth on the right side similar to that on the left side, but narrower; fins high, D. 72, A. 46.... **QUADRITUBERCULATUS.**

\*\* Dorsal fins beginning on the level of the upper lip, only four or five of its rays being on the left side of the median line.

† Posterior prominence of interocular ridge developed as a strong backward-directed spine; tubercular prominences present about the upper eye; no teeth on right side of lower jaw; fins rather low, D. 65, A. 45..... **VERTICALIS.**

‡ Posterior prominence of interocular ridge scarcely elevated; other ocular tubercles obsolete; teeth ?; fins high, D. 68, A. 48 ..... **CÆNOSUS.**

#### Measurements.

	<i>Verticalis.</i>	<i>Quadrituberculatus.</i>
Extreme length, in inches.....	9.20	11.85
Length to base of caudal, in inches = 1.00.....	7.50 = 1.00	9.20 = 1.00
Body, greatest depth.....	.54	.62
Body, least depth of tail.....	.14	.13
Head, length.....	.24	.23
Head, diameter of orbit.....	.07	.063
Dorsal, distance from first ray to median line.....	.055	.11
Dorsal, greatest height.....	.13	.19
Anal, greatest height.....	.13	.18
Caudal, length.....	.255	.28
Pectoral, length.....	.135	.18
Ventral, length.....	.11	.11

A second example of *Nystreuryx liolepis*, taken at Santa Barbara, is sinistral. The species is, therefore, like *Paralichthys maculosus* and *Platichthys stellatus*, both dextral and sinistral. In the second example the small accessory scales are extremely numerous.

Two more examples of the species, noticed by us as *Platysomatichthys stomias*, have been obtained in trawl-nets from near the Farallones. This species is apparently not congeneric with *Platysomatichthys hippoglossoides*, differing in the long and slender gill-rakers and the ctenoid scales, as well as in the dentition, narrow interorbital space, and other minor details. The large teeth in both jaws, and the small teeth in the outer row in the upper jaw, are distinctly *arrow-shaped*, being abruptly widened toward the tip, thence acutely triangular.

We propose to consider this species as the type of a distinct genus, which may be termed *Atheresthes*, from the arrow-shaped teeth. It may be thus defined :

*Atheresthes* gen. nov.

Eyes and color on the right side. Body long and slender, closely compressed, tapering into a long and slender caudal peduncle. Mouth extremely large, oblique, the long and narrow maxillary extending beyond the eye. Both jaws with two irregular series of unequal, sharp teeth, which are anteriorly long and slender, posteriorly short. All the long teeth of both jaws, and the outer series of small teeth in the upper jaw, arrow-shaped. Some of the anterior teeth freely depressible. Interorbital space narrow. Gill-rakers long and strong, numerous. Scales comparatively large, ciliated, thin, and readily deciduous, those on the blind side similar, smooth. Lateral line without arch. Fins low and rather fragile, the dorsal beginning over the eye, its anterior rays low. Caudal lunate; no anal spine. Pectorals and ventrals small, the latter both lateral.

Type, *Platysomatichthys stomias* Jor. & Gilb.

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#### NOTES ON SHARKS FROM THE COAST OF CALIFORNIA

By DAVID S. JORDAN and CHAS. H. GILBERT.

The following species of sharks, not hitherto recorded from the Pacific coast of the United States, have been observed by the writers during the present winter (1880) :

##### 1. *Isurus oxyrhynchus* Rafinesque. (?)

The jaws of a species of *Isurus* were obtained by us at San Pedro, the shark having been taken off Santa Catalina Island. The teeth agree essentially with those of *Isurus oxyrhynchus* (*Lamna spallanzani* of authors). *Isurus glaucus* has, however, also the same dentition, hence we are unable exactly to determine the species.

2. *Carcharodon rondeleti* Müller & Henle.—*Man-eater Shark*.

A large individual of this species was lately harpooned at the whaling station of Point Carmelo, near Monterey. Its jaws, now in the possession of Mr. A. C. Keating, a druggist at Monterey, are about two feet across.

Schools of this species are said to be occasionally noticed in the open sea from Monterey southward.

3. *Cetorhinus maximus* (Linnaeus) Blainville.—*Basking Shark*; *Ground Shark*.

An individual of this species, 31 feet in length, was taken March 25 by the whalers at Monterey, and another somewhat larger on March 26. Several others were noticed, but only two were secured. We are told that eighteen or twenty years ago several of them were taken at Monterey, since which time few or none have been noticed in the bay.

4. *Carcharhinus glaucus* (L.) Blainville.—*Blue Shark*.

A young individual of this species, taken in San Francisco Bay, is in the museum of the California Academy of Sciences. A "Blue Shark" is found in the open sea along the southern coast of California, but I do not know whether it is this species.

5. *Galeorhinus galeus* (L.) Blainville.

As already noticed, this species is the most abundant shark of Southern California. It is common at Santa Barbara, and I am told is not unfrequently taken at Monterey.

6. *Galeocerdo tigrinus* Müller & Henle.—*Man-eater Shark*.

As already noticed by us, jaws of an individual of this species were seen by us at San Diego, near which place the animal was obtained.

7. *Cephaloscyllium laticeps* (Duméril) Gill.—*Ground Shark*.

The occurrence of this species at San Pedro has been already noticed by us. At Santa Barbara it is, next to *Triakis semifasciatus*, the most abundant of the sharks. It is there taken daily in the lobster-pots set for the "craw-fish" (*Palinurus interruptus*). Its habit of inflating itself, when caught, by swallowing air, is very remarkable.

8. *Pleuracromylon lævis* (Risso) Gill.

Two specimens of this species have been obtained by us at Monterey. One of them, a female, taken March 26, had the young about 8 inches long, each of them connected by a long umbilical cord to a placenta which is attached to the uterus. The occurrence of this shark, in connection with its relative, *Mustelus hinnulus* (*vulgaris*, *canis*, etc.), on the Pacific coast, is very interesting.

MARCH 26, 1880.

ON THE GENERIC RELATIONS OF *PLATYRHINA EXASPERATA*.

By DAVID S. JORDAN and CHARLES H. GILBERT.

A short time since a small ray was described by the present writers, from San Diego, under the name of *Platyrrhina exasperata*. (Proc. U. S. Nat. Mus. 1880, —.) Soon after a second species was described by us, from Santa Barbara, as *Platyrrhina triseriata*. (Proc. U. S. Nat. Mus. 1880, —.)

The two species are certainly not congeneric. The former species has the skin above covered with stellated prickles of different sizes, and resembles the genus *Raia*. The latter is covered over by a uniform fine shagreen, and resembles the species of *syrrhina* and *rhinobatus*. So far as we can ascertain from the description given by Duméril and Günther of *Platyrrhina sinensis* and *Platyrrhina schænleini*, these two species agree with *Platyrrhina triseriata* in the character of the dermal covering, as well as in form of body. We propose therefore to consider *Platyrrhina exasperata* as the type of a distinct genus, *Zapteryx*, distinguished from *Platyrrhina* by the presence of detached, unequal, stellated prickles on the skin above, instead of the uniform shagreen covering found in *Platyrrhina*, and from *Raia* by the convex outline of the ventrals and by the greater development of the dorsal and caudal fins. In *Raia* the ventrals are always emarginate.

MARCH 26, 1880.

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REMARKS ON THE SPECIES OF THE GENUS *CHIRUS* FOUND IN SAN FRANCISCO MARKET, INCLUDING ONE HITHERTO UNDESCRIBED.

By W. N. LOCKINGTON.

Four species of the genus *Chirus* occur in the markets of this city. The two most abundant of these are *C. constellatus* and *C. guttatus* Grd. Of the others, one is *C. pictus* Grd., while the other has until now remained undescribed.

*C. pictus* is separated from the others by some sufficiently obvious external characters, beside those of color, as will be evident from the subsequent remarks, but the writer is unable to find any constant character except that of the coloration by which to distinguish the other three species.

As, however, he has now seen several hundred examples of *C. guttatus* and *C. constellatus*, and a large number of both the other species, and as, notwithstanding the considerable variation in the size, number, and position of the marking of each species, neither on any occasion shows the slightest tendency to approach the pattern of another, he submits that in this group the pattern of the coloration may be considered specific.



Difficult though it may be to prove upon paper the distinctness of these forms, there do not exist on this coast any other four species belonging to one group which can be so unerringly separated by the eye.

*Diagnosis.*

Suborbital stay scaleless; diameter of orbit about $\frac{1}{10}$ of total length.	{	Sides with purple blotches; pectorals barred.	{	<i>C. pictus.</i>
		Sides with rings of small dark round spots surrounding areas of lighter color than the general ground; pectorals sharply spotted.		<i>C. constellatus.</i>
Suborbital stay scaly; diameter of orbit about $\frac{1}{10}$ of total length.	{	Sides with irregularly scattered circular or subcircular spots; pectorals nearly plain.	{	<i>C. guttatus.</i>
		Sides with irregularly shaped blotches, disposed in five or six longitudinal series.		<i>C. maculo-serialus</i>

**C. pictus.**

This form is more inconstant in the number of its fin-rays and in the coloration than any of the others.

Six specimens now before me vary as follows in the rays of the dorsal and anal:

No. 1. Locality, San Francisco market.....	D.	XX, $\frac{1}{2}$ ; A. 21
No. 2. Locality, San Francisco market.....	D.	XXI, $\frac{1}{2}$ ; A. 22
No. 3. Locality, San Francisco market.....	D.	XXI, $\frac{1}{2}$ ; A. 21
No. 4. Locality, Kadiak Island, Alaska.....	D.	XIX, $\frac{1}{2}$ ; A. 21
No. 5. Locality, San Francisco market.....	D.	XIX, $\frac{1}{3}$ ; A. 21
No. 6. Locality, Kadiak Island, Alaska..	D.	XVIII, $\frac{1}{2}$ ; A. 24

The color of all the species changes rapidly on exposure to air or immersion in alcohol.

No. 2, when fresh, was of a brilliant green upon the belly and lower part of the flanks, deepening into brown above, and blotched with bright purple. After exposure, the ground tint becomes first reddish, and finally dull purplish brown, while the purple blotches gradually fade into dirty white.

The dorsal and anal are blotched like the body, and the pectorals barred with the same tints.

In all the examples examined, the ventrals are shorter than the pectorals, and fall considerably short of the vent; and the lowest pair of lateral lines unite much nearer to the ventrals than to the vent.

I can perceive no constant difference between specimens from Alaska and those found in our market. The most ordinary number of rays in the first dorsal appears to be nineteen.

No. 1 differs from all the others in the total absence of brighter blotches upon the sides, but the pectorals are barred, and all other characters coincide.

**Chirus constellatus.**

First dorsal, in all the individuals examined, with twenty-one rays,



and ventrals overpassing pectorals and reaching nearly or quite to the vent.

Lowest lateral line usually forking about midway between ventrals and vent.

*Pectoral spotted all over with light and dark spots.*

Common in the bay of San Francisco.

**Chirus guttatus.**

First dorsal with twenty or twenty-one rays, ventrals and pectorals usually about even posteriorly and scarcely reaching to the vent; position of the fork of the lowest lateral line somewhat variable.

Spots on sides bright orange when fresh, but becoming dark on exposure to air or alcohol.

**Chirus maculo-seriatus** nov. sp.

D. XXI,  $\frac{1}{23}$ ; A. 22-23; P. 19; V.  $\frac{1}{5}$ ; C. (principal rays) 15; L. lat. 110.

Body elongate, compressed, the greatest height about one-fifth of the length (caudal included); greatest thickness, at opercles, about three-fourths of the greatest height; depth of caudal peduncle about  $\frac{10}{27}$  of the greatest depth; head about one-fourth of total length.

Dorsal outline rising at an angle of about 20°, with a slight curve to the origin of the dorsal, or to about its fifth ray, whence it descends gradually in a straight line to the caudal peduncle, which is wedge-shaped, increasing in width towards base of tail.

Abdominal outline descending slowly to the scapular girdle, thence nearly level to anal; anal base sloping upwards with a slight curve.

Snout longer than orbit; interocular width slightly less than length of orbit; forehead slightly curved transversely, summit of ascending premaxillary processes rising slightly above the profile of the snout.

Anterior nostril with the edges raised into a short tube.

Eyes lateral, elliptical; a fimbriated flap over the orbit.

Jaws subequal, the upper slightly projecting; posterior extremity of maxillary reaching slightly beyond anterior margin of orbit, that of mandible below the center of the pupil.

Cardiform teeth in both jaws, in several rows in front, diminishing to a single series at the sides, the outer row larger than the others; a patch of similar teeth upon the vomer, and occasionally a few on the anterior part of the palatines, a character which certainly cannot be of generic value in this group. Branchiostegals six; gill-openings continuous below, no isthmus; gill-rakers obsolescent, transverse.

Dorsal arising above the flap of the opercle, slightly in front of the pectoral base, deeply notched; the first dorsal strongly arched on its upper margin; the first ray much shorter than the second; the other rays increasing in height to about the fourth, thence diminishing to the twentieth, which is considerably shorter than the unarticulated ray at the commencement of the second portion of the dorsal.

Second dorsal lower than the first, the rays increasing to about the

fourth; upper margin straight, slightly diminishing in height to the nineteenth ray, four last rays diminishing rapidly.

Anal commencing even with the second dorsal, and coterminous and similar to it; rays increasing to the third; last ray short.

Caudal slightly emarginate on posterior margin, with numerous accessory rays running some distance up the profile of the caudal peduncle; principal rays twice bifurcate. Vent somewhat in advance of the anal.

Pectorals rounded, central rays longest, their tips about even with the nineteenth dorsal spine; rays simple; base vertical.

Ventrals inserted well behind the pectorals, beneath the sixth dorsal spine; second ray longest, its tip slightly overpassing the vent; three longest rays overpassing the pectoral.

Lateral lines five on each side, two above and two below the principal line.

The uppermost on each side commence close together on the occiput, run along the dorsal base outside the first row of scales, and end at the fourteenth ray of the soft dorsal.

The second commences on the occiput, and is continued to the base of the uppermost principal caudal ray.

The third commences on the scapular region, runs parallel with the dorsal outline till it becomes median upon the caudal peduncle, and is continued some distance upon the caudal.

The fourth commences slightly in front of the pectoral base, and continues parallel to the abdominal outline to opposite the seventeenth anal ray.

The fifth pair are united into a median abdominal line at a point about half way between the vent and the axil of the ventrals; anterior to this point the single line runs forward to the pectoral girdle; posterior to it each division runs parallel with the anal base, and ends at the base of the lowest principal caudal ray.

Scales ctenoid, rather larger on the anterior portion of the body than on the posterior; the ciliation obsolete on the scales of the side of the head. Suborbital stay squamose. Snout, preorbital, and interoperculum scaleless. Membrane between caudal rays scaly.

Pectoral base scaly; some small scales at base of rays of first dorsal; second dorsal with small scales between the rays for about half its height. Anal scaleless.

Color, in alcohol, brown, blotched with yellowish blotches in longitudinal series.

This hitherto undescribed species is tolerably common in the markets of San Francisco at some seasons of the year.

When fresh, the series of blotches along the sides are bright orange and bright maroon.

A type specimen is in the National Museum.

Table of measurements.

Current number of specimen. Locality .....	No. 1. San Francisco.		No. 2. San Francisco.	
	Inches and 100ths.	100ths of length.	Inches and 100ths.	100ths of length, including caudal.
Extreme length.....	13.35	.....	11.60	.....
Body:				
Greatest height.....	2.73	.208	2.90	.248
Greatest width.....	1.99	.15	1.70	.144
Height at ventrals.....	2.62	.197	2.90	.248
Least height of caudal peduncle.....	1.03	.078	1.03	.09
Head:				
Greatest length.....	3.28	.245	2.96	.26
Distance from snout to nape.....	2.2	.165	1.93	.165
Width of interorbital area.....	.62	.045	.66	.056
Length of snout.....	.95	.07	1.00	.86
Length of maxillary.....	1.20	.09	1.14	.100
Length of mandible.....	1.53	.115	1.36	.085
Diameter of orbit.....	.68	.051	.....	.....
Dorsal (spinous):				
Distance from snout.....	3.20	.24	3.06	.262
Length of base.....	3.32	.25	3.30	.285
Greatest height.....	1.64	.123	.....	.....
Height at first spine.....	1.00	.074	.....	.....
Dorsal (soft):				
Length of base.....	3.80	.285	3.50	.30
Height at longest ray.....	1.32	.10	.....	.....
Anal:				
Distance from tip of lower jaw.....	6.48	.485	5.55	.48
Length of base.....	3.67	.275	3.46	.296
Height at longest ray.....	1.22	.093	.....	.....
Caudal:				
Length of middle rays.....	1.78	.135	1.60	.138
Length of external rays.....	1.84	.14	1.80	.152
Pectoral:				
Distance from snout.....	3.43	.257	2.85	.245
Length.....	2.85	.215	2.36	.202
Ventral:				
Distance from tip of lower jaw.....	4.16	.314	3.25	.28
Length.....	2.15	.162	2.16	.185
Branchiostegals.....	6	.....	6	.....
Dorsal.....	XXI, $\frac{1}{23}$	.....	XXI, $\frac{23}{23}$	.....
Anal.....	23	.....	23	.....
Caudal, principal rays.....	15	.....	15	.....
Pectoral.....	19	.....	19	.....
Ventral.....	$\frac{1}{2}$	.....	$\frac{1}{2}$	.....
Number of scales in lateral line to base of caudal.....	110	.....	111	.....
Number of transverse rows above lateral line.....	15	.....	15	.....

The proportions of the two specimens measured differ considerably, No. 2 being much deeper in proportion to its length than No. 1, and having its greatest depth immediately over the ventrals, instead of at the origin of the dorsal.

In consequence of the more elongate form, the insertions of the ventrals and of the pectorals are relatively farther back in No. 1 than in No. 2.

Similar differences of proportion exist in *C. constellatus*, and it is evident that no weight can be attached to proportion in distinguishing these species.

Neither is it advisable, in view of individual differences observed, to attach much significance to the length of the ventrals, or to the position of the fork of the lowest lateral line.

*C. maculo-seriatus* is by no means scarce in our markets, but is less abundant than *guttatus* and *constellatus*.

An example of this form is in the National Museum at Washington, numbered ———.

**DESCRIPTION OF A NEW FISH FROM ALASKA (URANIDEA MICROSTOMA).****By W. N. LOCKINGTON.***Uranidea microstoma.*

Body long and low, little compressed.

Head depressed, rather small, wider than deep; anterior portion of body about equal in width and depth, somewhat flattened on back near head, and gradually becoming more and more compressed posteriorly.

Dorsal outline regularly arched, its highest point at origin of first dorsal; abdominal outline nearly straight in some examples.

Head about  $4\frac{2}{5}$  to  $4\frac{1}{6}$ ; breadth of same  $5\frac{1}{3}$  to  $4\frac{1}{2}$  times in the total length; orbit about 5, snout 4 to  $3\frac{1}{2}$  times in the length of the head.

Eyes directed upwards, elliptical, the orbits not elevated above the general surface; interorbital width nearly equal to the transverse diameter of the orbit.

Mouth short, small compared with others of the genus; posterior extremity of maxillary a little beyond the front margin of the orbit; upper margin of maxillary hidden behind the preorbital in the closed mouth, except the short, broad, posterior extremity, which is free.

Lower jaw shorter than the upper, and closing within it.

A broad band of villiform teeth in front of both jaws.

Teeth on vomer, none on palatines.

Subopercular spine much developed, directed forwards; preoperculum ending in a single sharp, straight spine; branchiostegals 5.

First dorsal commencing a little behind the pectoral base, low, the upper margin nearly straight; height less than that of second dorsal, the rays nearly equal in length.

Second dorsal commencing above the vent, first ray shorter than the second; upper margin a straight line, the height of the fin diminishing regularly but slowly posteriorly.

Anal shorter than second dorsal, commencing opposite the third and ending opposite the seventeenth ray of that fin; anteriorly rounded, the rays increasing to the fourth, thence somewhat diminishing posteriorly; depth greater than the height of the second dorsal.

Pectoral wedge-shaped, seventh ray longest; rays fleshy, simple; tip of seventh ray reaching about to the vent.

Ventrals inserted a little behind insertion of pectorals, the tips not reaching the vent, consisting of one spine and four rays; second, third, and fourth rays longest.

Caudal slightly convex on its posterior margin when expanded; the rays twice bifurcate, first bifurcation at about a third of their length from the base.

Vent not separated from the anal fin by any considerable space; rays simple.



Lateral line deflected downwards suddenly at posterior extremity of second dorsal, thence posteriorly along center of caudal peduncle, and anteriorly parallel to dorsal outline; pores simple, 35-37.

Body scaleless, entirely smooth.

Color olivaceous above, lighter below; upper portion maculated with darker; fins with small dark spots on the membrane; a dark band across caudal.

Two specimens (Nos. 1 and 3) from fresh water, near Saint Paul's, Kodiak, collected by W. J. Fisher. In No. 1 the dorsals are separated by a considerable space; in No. 3 by a smaller space. One of these is in the United States National Museum, numbered —.

Numerous specimens from the Aleutian Islands, collected by Captain Greenebaum, present no difference except in the more or less complete union of the dorsals, and their smaller size. The latter are probably half grown.

As the fin-rays and other characters agree closely, I am inclined to think the separation of the dorsals either an individual character, or one due to greater age.

Mr. Fisher's examples were obtained in fresh-water lakes formed by the melting snows, and communicating with the ocean only by shallow outlets. This species differs from those of the genus found in the United States by its smaller mouth, lower fins, and the four soft rays in the ventrals. In all these respects it resembles the European *Uranidea gobio*.

*Dimensions.*

	No. 1.	No. 2.	No. 3.
Total length.....	4.87	3.38	4.30
Greatest depth.....	.85	.....	.75
Depth of caudal peduncle.....	.29	.18	.27
Length of head.....	1.06	.80	1.03
Width of head.....	.94	.75	.81
Longitudinal diameter of orbit.....	.21	.15	.22
Length of snout.....	.30	.21	.31
Tip of snout, along top of head, to origin of first dorsal.....	1.30	.....	1.25
Length of base of first dorsal.....	.75	.54	.73
Length of base of second dorsal.....	1.62	1.15	1.37
Tip of snout to insertion of ventrals.....	1.12	.....	.94
Length of ventrals.....	.73	.55	.70
Length of pectorals.....	1.00	.62	.94
Tip of lower jaw, along abdomen, to origin of anal.....	2.36	.....	2.10
Length of anal base.....	1.28	.95	1.25
Number of dorsal rays.....	8-19	9-19	8-19
Number of anal rays.....	14	14	12
Number of pectoral rays.....	14	14	14
Number of caudal rays.....	5-10-2	.....	.....



DESCRIPTION OF A NEW SPECIES OF AGONIDÆ (*BRACHYOPSIS VERRUCOSUS*), FROM THE COAST OF CALIFORNIA.

By W. N. LOCKINGTON.

*Brachyopsis verrucosus*.

D. VII-IX, 7-8. A. 10-11. P. 14-15. V. 1-3. C. 2-10, 2. Lateral seute, 34-36.

Form elongated, slender, lateral dorsal outline rising very gradually from the snout to above the base of the pectoral; central part of the upper orbital margin elevated above the line of the forehead and occiput, as is also the tip of the lower jaw and front portion of the snout, so that there is a not very conspicuous depression in front of the eye.

From the highest point the dorsal outline descends gradually to the elongated and narrow caudal peduncle.

Abdominal outline from posterior extremity of mandible to caudal peduncle straight.

Greatest height about 11; greatest width  $7-7\frac{1}{2}$ ; length of head  $4\frac{1}{2}-4\frac{1}{4}$  times in total length to tip of caudal (mouth closed); greatest depth about  $1\frac{1}{2}$  in greatest width; depth of caudal peduncle about  $3\frac{3}{4}$  times in the greatest depth.

Mouth oblique, the lower jaw projecting considerably beyond the upper, its tip entering into the dorsal outline, and its posterior extremity reaching to a vertical from the anterior margin of the pupil.

Mandible half or nearly half the length of the head.

Maxillary short, broad posteriorly, and set at a more oblique angle than the mandible, below which the lower angle of its posterior margin projects when the mouth is closed, while the entire length of its upper margin is hidden beneath the preorbital in the closed mouth; a short and slender barbel at its posterior extremity.

Entire length of upper jaw less than  $\frac{1}{3}$  that of head.

Teeth uniform in both jaws, villiform, very small, in a band which is widest in front, but divided in the center.

A patch of similar but even finer teeth (perceptible to the touch, but scarcely to the eye) on vomer, and another on each palatine.

Eyes directed laterally and somewhat upwards, oval, their longitudinal diameter a little less than the length of the snout, and about  $4\frac{1}{6}-4\frac{1}{3}$  in the length of the side of the head; interorbital area sunken, its width about 5 times in the length of the head.

Snout a little longer than the longitudinal diameter of the eye; two short backward-directed spines on its summit, slightly posterior to the line of the tubes of the nostrils.

Preorbital large, with several small spines on its lower margin.

Supraorbital margin set with small spines, and rising in its posterior portion to a spinulose crest.

Lower orbital margin prominent, a pair of spines at its posterior extremity, the hinder the larger.

Preoperculum with a spinulose longitudinal ridge, ending in a backward-directed spine; a second smaller spine below this, at angle; lower limb with two flat angular projections.

Operculum striate, with a ridge, ending in a spine, on its upper part.

Occipital and lateral ridges of upper surface of head prominent, spinulose or denticulated above, but without spines; lateral ridges each formed of three shorter ridges; no pit on occiput.

Gill-membranes continuous below, without isthmus; branchiostegals five, large.

Pectoral very long, boldly rounded on its posterior and lower margins, broad; the upper rays slightly increasing to about the sixth, the five lowest decreasing rapidly. Tips of the longest rays reaching nearly to or beyond the sixth dorsal ray, or to the back of the thirteenth or fourteenth dorsal scute. Longest rays about equal in length to the head. Rays simple, base slightly oblique.

Ventrals inserted on the plane of the upper pectoral axil, longer than the pectorals, their greatest length about 4 times in the total length, and consisting of a spine and two rays, the spine attached to the first ray, which is of considerable length, but shorter than the second, the tip of which extends beyond the second anal ray. Membrane between the two rays broad; the second ray fringed with a membrane along its internal margin.

First dorsal commencing at about the eighth dorsal scute and terminating at the sixteenth. First spine shorter than the second, the next five about equal in length, the remainder diminishing rapidly. Height of the longest spines somewhat exceeding the depth of the body below the fin.

Second dorsal about equal in height and similar in form to the first, arising at about the nineteenth dorsal scute, and terminating at or near the twenty-seventh. First ray shorter than the second, the next four nearly equal, the remainder falling rapidly.

Anal commencing directly below the last ray of the first dorsal, and coterminous with the second dorsal, its lower margin nearly straight, and its depth rather less than the height of the second dorsals.

The last rays of the dorsals and anal are joined to the body by membrane.

Posterior margin of caudal convex; accessory rays few.

Dorsal scutes 35-36, the two series approaching and uniting a little behind the second dorsal; about seven scutes between the point of junction and the caudal.

Each scute produced posteriorly into a large spine bent backwards, and frequently denticulated upon its anterior or outer edge. Behind the point of junction of the two dorsal rows the spines are in closely coupled pairs.

Lateral series of scutes each consisting of 34-36 plates, each armed with a spine similar to those above described.

Ventral series containing 29-31 plates, the last three or four single, the remainder forming a double series similar to the dorsal series, but with less conspicuous spines.

The ventral series commences at the axils of the ventral fins, and the lower surface between these fins and the gill-openings is occupied by several large, separate, subcircular, strongly striated scales or plates, those running along the margin of the gill-openings placed closer together, and forming a series of about seven.

About seven pairs of subcircular scales, not striated, or only slightly striated, are scattered along the acutely triangular space behind the ventrals, between the two ventral series of scutes, which do not fairly meet each other anterior to the anal fin. An elongate naked area behind the pectorals, separating the lower lateral from the ventral series.

Some small scales in the space between the mandibles, and a series of small, elevated, and sharp-pointed scales along the curve of the pectoral base.

Vent not far behind the base of the ventrals.

The center of the interocular space, the area between the occipital ridges, some spaces on the lateral aspect of the head between the more prominent parts of the bones, and the areas between the large scales in front of the ventral are set with numerous prickles, a few of which also occur in the intermandibular area.

Similar prickles are numerous on the anterior portion of the trunk, occupying the spaces between the parallel dorsal and upper lateral series of scutes; those of the upper surface end at the first dorsal, those of the upper lateral surfaces at the posterior extremity of the same fin. Behind these points the scuta of these surfaces closely interlock.

Lateral line continuous; a pore between each pair of scutes; pores simple.

*Color.*—After exposure to alcohol, the upper and lateral surfaces of the body are banded alternately with dull yellowish and olivaceous brown; pectorals whitish on their basal portion, a dark spot on the upper and another on the lower edge excepted, and dark on their terminal part, the margin of the dark color running obliquely from the center of the first to the tip of the eleventh ray.

Ventrals with a large black spot on the membrane inside the first ray, and two small spots near the tip of the membrane. Abdomen yellowish white.

When somewhat fresher, the dirty yellowish tint of the ventrals was bright orange yellow, and the black of that fin was more positive, so that it is probable that in life the colors of the whole body were much brighter than they are now.

The total length of the specimens examined, from tip of lower jaw (mouth closed) to tip of caudal, varied from 5.68 inches to 6.65 inches.

Actual measurements of the parts are not given, as the proportions vary but little.

Several examples were collected November 26, 1879, at a depth of ten fathoms, in Drake's Bay, 35 miles north of San Francisco, by Mr. Voy, who has presented them to the State University, Berkeley, Cal.

One of the types is in the United States National Museum, numbered —.

This species is referred to the genus *Brachyopsis*, proposed by Dr. Gill for the reception of *Agonus rostratus*.

This genus is distinguished from *Agonus* by the projecting lower jaw and consequent comparatively large terminal mouth, and by the absence of an isthmus.

**DESCRIPTION OF A NEW GENUS AND SOME NEW SPECIES OF CALIFORNIA FISHES (ICOSTEUS ÆNIGMATICUS AND OSMERUS ATTENUATUS).**

**By W. N. LOCKINGTON.**

Fam. BLENNIDÆ (?).

**ICOSTEUS.**

Body much compressed. Teeth in a single row in both jaws, close-set, sharp. No teeth on vomer, palatines, or pharyngeals. Gill-openings continuous under the throat, composed of flexible rays, the anterior simple.

A single long dorsal fin; anal similar. Base of pectorals fleshy. Ventrals thoracic in position. Lateral line with groups of spines. Pseudo branchiæ.

Body scaleless throughout; fins beset with spinules along the rays.

Etymology: *εἰζω*, to yield; *ὀστέον*, bone.

***Icosteus ænigmaticus*.**

Body much compressed throughout; head thicker than any portion of the body. Dorsal outline rising rapidly to the origin of the dorsal; thence more slowly in a regular curve to about the center of the length of the body; thence curving gradually downward to the caudal peduncle. Abdominal outline regularly curved.

Upper and lower outlines of caudal peduncle concave, the peduncle widening posteriorly to support the fin-shaped caudal.

Greatest depth about  $3\frac{1}{2}$  times in total length; length of head about 5 times in total length; eye 6; snout more than 3; interorbital width about  $2\frac{1}{2}$  times in the length of the head; caudal peduncle about  $5\frac{1}{2}$  times in the greatest depth.

Nostrils simple, elongate-elliptical; eyes lateral, their diameter less than the length of the snout; mouth-opening rather large, horizontal, or nearly so; tip of the intermaxillary below the lower margin of the eye; margin of upper jaw formed of the intermaxillaries only; maxilla-



ries narrow throughout, not hidden beneath the preorbital; posterior extremity of the maxillary extending to a little beyond a vertical from the center of the eye.

Teeth in jaws in a single row, numerous, fine, sharp-pointed, closely and regularly set, those in the upper jaw smaller than those in the lower. No teeth on vomer or palatines. No pharyngeal teeth present.

Gill-rakers flexible, few, about half as long as the diameter of the eye on the first branchial arch, diminishing on each successive arch.

Gill-openings continuous under the throat; branchiostegals six.

Dorsal commencing at a vertical above the pectoral axil, and consisting of 52-55 rays, all soft and flexible, but some of the anterior ones unbranched. Anterior portion of dorsal low, the rays gradually increasing in height posteriorly, the base of the fin terminating opposite to that of the anal, at about  $1\frac{1}{2}$  times the least width of the caudal peduncle from the origin of the caudal fin; but the longest rays (last but two or three) extending backwards almost to the origin of the central caudal rays. None of the dorsal rays bifurcate more than once.

Anal commencing opposite the 24th-27th dorsal ray; similar to and about equal in depth to the height of the posterior portion of the dorsal, consisting of 37-40 rays, most of them once bifurcate; its base terminating opposite to that of the dorsal, and its longest posterior rays extending backwards even with those of the latter; three last anal rays diminishing rapidly in length.

Some of the anterior anal rays appear to be unbranched.

Caudal elongate, fan-shaped, the central rays longest, and the posterior margin greatly rounded. Posterior part of caudal peduncle expanded, and forming the larger half of an ellipse, around which the rays are set; the central ones straight, the outer ones curving outward and backward. Accessory rays numerous; principal rays twice bifurcate.

Pectorals with a fleshy base, having a curved posterior border from which the rays radiate, forming a fan-shaped fin; the central rays longest, the others diminishing regularly on both sides. All the rays straight; the seven or eight central ones twice, the others once, bifurcate.

Ventrals inserted a little behind the base of the pectorals, narrow, consisting of a short (spinous?) and four long rays.

Lateral line conspicuous, curving downwards above the pectoral until, a little posterior to the origin of the anal, it reaches the median line of the trunk, along which it continues till it dies out upon the fleshy base of the caudal.

Groups of small spines along the entire length of the lateral line, the number of spines in each group variable. About 120 groups of spines in the smaller example. No scales upon any portion of the body or fins, but the latter rendered rough by asperities or small spinules; a single series along the base of each ray, and a series along each of its branches.

*Color.*—Purple spots and blotches of irregular shape upon a yellowish-brown ground; the spots largest upon the dorsal region, and becoming



smaller and more numerous near the lateral line. The region above and behind the pectorals beset with numerous purple spots, smaller than those above the lateral line. Beneath the lateral line, on the posterior part of the body, there are no spots, except along the line of the anal; but probably this is the result of exposure to alcohol, which has caused the disappearance of most of the spots from the smaller specimen, the color of which, when fresher, was like that of the larger.

Throat and greater portion of gill-membranes without blotches, but sown with dark points, which occur also over the whole of the body and the interior of the mouth. Fleishy bases of caudal and pectorals with several purple blotches. Fins darker than the body, and showing traces of blotches of a deeper tint, especially upon the caudal.

Vertebrae numerous; vertebral column highly flexible and soft.

Cranial bones tolerably firm, those of the face and opercles, &c., highly flexible.

Entire body characterized by a lack of firmness, as it can be doubled up as readily as a piece of soft, thick rag. Swim-bladder large.

I append measurements of the two specimens, but many of these must be regarded as approximate only, in consequence of the distortion arising from the softness of texture of the fish, together with that consequent upon cutting them open shortly after they were first procured.

In the larger specimen the ventrals are partly destroyed, and the tips of many of the dorsal and anal rays are wanting.

The shape of the head in the two examples is very different, doubtless owing to the flexibility of the bones. In the larger the snout is bluff, almost perpendicular, the dorsal outline rises rapidly to the origin of the dorsal, and the tip of the premaxillaries is far below the eye; while in the smaller the dorsal outline slopes regularly from the tip of the snout, which is almost level with the lower margin of the eye, to the origin of the dorsal.

*Dimensions.*

	No. 1.	No. 2.
Total length, to tip of caudal.....	10 $\frac{1}{2}$	11 $\frac{1}{2}$
Greatest depth (approximate).....	2 $\frac{3}{4}$	3 $\frac{1}{2}$
Depth of peduncle of tail where narrowest.....	1 $\frac{1}{2}$	2 $\frac{1}{2}$
Length of head.....	2 $\frac{1}{2}$	2 $\frac{1}{2}$
Diameter of eye.....	1 $\frac{1}{2}$	1 $\frac{1}{2}$
Interorbital width.....	1 $\frac{1}{2}$	1 $\frac{1}{2}$
Length of upper jaw.....	1 $\frac{1}{2}$	1 $\frac{1}{2}$
Length of snout.....	1 $\frac{1}{2}$	1 $\frac{1}{2}$
Tip of snout to origin of dorsal.....	1 $\frac{1}{2}$	1 $\frac{1}{2}$
Length of base of snout.....	1 $\frac{1}{2}$	1 $\frac{1}{2}$
Length of longest posterior dorsal rays.....	1 $\frac{1}{2}$	1 $\frac{1}{2}$
Interval between dorsal and caudal.....	1 $\frac{1}{2}$	1 $\frac{1}{2}$
Tip of mandible to anal fin.....	5	5 $\frac{1}{2}$
Length of anal base.....	3 $\frac{1}{2}$	3 $\frac{1}{2}$
Origin of dorsal to upper axil of pectoral.....	1 $\frac{1}{2}$	2
Upper axil of pectoral to tip of snout.....	1 $\frac{1}{2}$	2 $\frac{1}{2}$
Length of pectorals.....	1 $\frac{1}{2}$	1 $\frac{1}{2}$
Length of ventrals.....	1 $\frac{1}{2}$	1 $\frac{1}{2}$
Number of dorsal rays.....	55	52 or 53
Number of anal rays.....	40	37
Number of groups of spines in lateral line.....	Circa 110	Circa 129

These two individuals, together with a third of smaller size, and certainly of another species, were procured in the market of San Francisco by W. G. W. Harford, in 1876. The fishmonger called them "deep-sea fish," and said that he had never seen the kind before. No others have appeared in the market since. A smaller example is in the museum of the State University, Berkeley, and was procured in Washington Territory.

The relations of this fish are probably with the Blennioid fishes. It can, however, hardly be referred to any of the current families, and should perhaps form the type of a separate one.

*Osmerus attenuatus.*

*Osmerus elongatus* Lockington, Rep. Commissioners Fisheries State of Cal., 1879, p. 43; not *Osmerus elongatus* Ayers, Proc. Cal. Acad., Vol. I, p. 17.

D. 1-10. A. 17. P. 14. V. 1-8.

Form elongate, fusiform, dorsal outline rising gently to a point just behind the origin of the pectoral, thence almost straight to dorsal, thence tapering regularly to the caudal peduncle. Abdominal outline straight from the posterior extremity of the maxillary to the ventrals, thence inclining upwards slowly to the caudal peduncle.

Greatest depth  $7\frac{2}{3}$ - $8\frac{3}{4}$  times; head  $4\frac{1}{2}$  to nearly 5 times in the total length; eye about 4 times in the length of the head; snout about the same length as the eye; caudal peduncle  $2\frac{2}{5}$ - $2\frac{3}{4}$  times in the greatest depth.

Viewed from above, the forehead and snout diminish in width anteriorly.

Nostrils conspicuous, divided by a thin partition, simple, situated on a line from the top of the pupil to the tip of the snout, and about halfway between the latter and the anterior margin of the orbit.

Eyes large, subcircular, entirely in the anterior half of the head; upper orbital margins raised, but the interorbital space between these margins flat transversely.

Mouth large, the commissure straight and ascending anteriorly at an angle of about  $30^\circ$ , the tip of the upper jaw horizontal with the center of the pupil, and the posterior extremity of the maxillary on a vertical line from the posterior margin of the pupil; mandible straight on its lower border, its tip projecting beyond that of the upper jaw.

Dentition tolerably strong, on jaws and palatines. Teeth of upper jaw in a single row, numerous, small, slender, those in front inclined forward, a large tooth at the symphysis.

Lower jaw with a double row of slightly recurved teeth in front, the outer extending only about one-fifth of the length of the sides of the mandible, the inner row extending along the sides, and consisting of larger teeth than the outer or than those of the upper jaw; the largest situated along the sides, and much wider apart than those of the upper jaw.

Inner palatine row of numerous small teeth; outer palatine series

very variable in its development, but usually consisting of few rather large teeth, increasing in size forwards, the anterior tooth sometimes quite a large canine. Teeth in front part of tongue in a single series on each side, with a single terminal tooth; all the teeth large and curved, the terminal tooth largest. A large patch of several rows of villiform teeth on the base of the tongue, marked off by a constriction from the terminal patch.

Gill-rakers long and slender, those of first pair of branchial arches half as long as the eye, the others diminishing gradually. Branchiostegals seven.

Angle of preoperculum a little more than a right angle, both the posterior and the inferior margins nearly straight. Posterior margin of gill-cover forming a bold and almost regular curve, its most posteriorly produced portion occupied by the suboperculum.

Pectoral of fourteen rays, the third or fourth longest, narrow, the rays bifurcate. Tips of the pectorals distant from the ventrals more than the length of the ventrals.

Ventrals not greatly shorter than the pectorals; the rays bifurcate, their tips not reaching to the anus; insertion of ventrals about one scale in advance of that of dorsal.

Dorsal of one spine and ten bifurcate rays, highest in front, the height about twice the length of the base; the second ray slightly longer than the first, the last longer than the spine. Anal commencing at about the posterior third of the total length, and consisting of seventeen branched rays, the first very short, the second nearly equal to the third and longest, the fourth nearly equal to the third, thence descending gradually.

Caudal deeply emarginate, almost forked; rays 11-10-9- $\frac{8}{10}$ , principal rays several lines branched.

Lateral line not very distinct, running along the center of the silvery band of each side. Scales rather large, their exposed portion forming a diamond-shaped pattern, each diamond about twice as deep as long. Head scaleless.

No scales upon the fins.

Adipose fin falcate, rather large.

*Color of the fresh fish.*—Light greenish gray on the back, the pattern of the scales marked by a series of black dots around the edge of each; these die out upon the silvery lateral line. A very bright silvery line along the side, reaching one scale above lateral line; the upper boundary of this band distinct, the lower fading into the silvery-white of the belly. Operculum and suboperculum bright like the lateral band, except above, where they become greenish gray like the back; snout and cheeks darker greenish gray than the back. Lower jaw with black points below and on the sides, closer together toward the tip. Fins spotted with dark points. Forehead between eyes almost black; eyes silvery; pupil black.

Locality, San Francisco.

The whole fish is highly transparent when fresh, the outline of the brain being clearly visible through the occiput.

From *Osmerus thaleichthys*, which at first sight nearly resembles it, this species may be distinguished by the following characters: The slightly greater length and more tapering form of the snout, when viewed from above; the straight lower jaw, which in *O. thaleichthys* is considerably curved upwards toward the tip; the gradual declivity of the upper outline of the head, which in the latter species is straight with the line of the back; the larger eyes; the different arrangement of the teeth; the more elongated body, much less curvate along the abdominal outline; and the much greater distance between the tips of the pectorals and the base of the ventrals.

*Dimensions.*

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.
	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>
Total length .....	4.12	4.50	5.25	5.72	5.06	6.00
Greatest depth of body .....	.55	.58	.60	.72	.62	.75
Length of head, to tip of lower jaw .....	.96	1.00	1.13	1.25	1.12	1.22
Longitudinal diameter of eye .....	.23	.23	.30	.29	.25	.30
Interorbital width .....	.19	.20	.23	.31	.26	.345
Length of snout, to tip of upper jaw .....	.23	.25	.28	.30	.28	.31
Length without caudal .....	3.47	3.84	4.42	4.87	4.30	5.09
Tip of lower jaw, to adipose fin .....	2.97	3.00	3.62	4.14	3.60	4.31
Tip of lower jaw, to ventrals .....	1.97	2.10	2.56	2.68	2.35	2.78
Length of pectoral .....	.50	.58	.63	.72	.65	.81
Height of dorsal .....		.56	.64	.75	.62	.69
Length of ventral .....	.45	.45	.56	.64	.53	.69
Tip of lower jaw to origin of dorsal .....	2.00	2.15	2.56	2.75	2.40	2.94
Length of lower jaw .....	.56	.60	.68	.70	.60	
Width of caudal peduncle .....	.20	.20	.24	.30	.26	.31

Nos. 1, 2, and 3 are alcoholic specimens; the others were measured while fresh.

The comparatively elongate form of this fish induced me to believe that this species must be *O. elongatus* Ayres (Proc. Cal. Acad. Sci., I, 17, 1854), but as the latter ichthyologist transmitted examples of his species to Washington, and these examples were examined by Girard, and found by him to be identical with his *Osmerus pretiosus* (= *Argentina pretiosa* Grd. = *Hypomesus olidus* (Pallas) Gill), there is no doubt that the foregoing is an undescribed species.

There are thus four species of *Microstomatidæ* on the Pacific coast, United States, viz, *Thaleichthys pacificus*, *Hypomesus olicetus*, *Osmerus thaleichthys*, and *O. attenuatus*. The first of these does not occur in the markets of San Francisco, but is sent down packed in salt from the Columbia River, also to some extent in oil, under the name of "Columbia River sardines." The other three are brought into the markets in a fresh state. *Hypomesus olicetus* grows to the largest size, and is most highly esteemed of the three. *Osmerus attenuatus* is tolerably abundant in the markets during the spring and summer months.



**DESCRIPTION OF A NEW HAKE (PHYCIS EARLLII), FROM SOUTH CAROLINA, AND A NOTE ON THE OCCURRENCE OF PHYCIS REGIUS IN NORTH CAROLINA.**

**By TARLETON H. BEAN.**

**1. *Phycis earllii* Bean.**

The United States National Museum has just received from Mr. R. E. Earll three specimens of a species of *Phycis* which differ from all the other recognized eastern American species. It is quite unlike *P. tenuis*, *P. chuss*, and *P. chesteri*, since none of the rays of the first dorsal are produced. In the shape of the anterior dorsal and the general form of the body it resembles *P. regius*, from which, however, it may be at once distinguished by its much smaller scales. From *P. DeKayi* Kaup it is well separated by the structure of its anterior dorsal, and by having the ventrals shorter than the head. The species differs also from *P. rostratus* Gthr. in having a much greater number of scales between the anterior dorsal and the lateral line.

Mr. Earll secured these fish in the market of Charleston. They were numbered 131 in his collecting invoice, and are catalogued as numbers 25207, 25208, and 25209 of the Museum Register. The species is dedicated to its discoverer, who first collected it and called attention to its specific distinctness from the four known east coast forms.

**DESCRIPTION.**—The species is short and stout, resembling in this respect *P. regius*. The greatest height of the body equals twice the length of the longest ray of the anterior dorsal, and is contained 5 times in the total length, caudal included. The length of the head is contained  $3\frac{2}{3}$  times in the length of the body, measured to the origin of the middle caudal rays. The length of the snout equals the distance between the eyes. The length of the upper jaw equals half that of the head. The length of the eye is contained nearly twice in length of snout,  $6\frac{1}{2}$  times in length of head, and nearly 4 times in the length of the postorbital part of the head. The lower jaw is as long as the upper, but is received within it. The maxilla extends somewhat behind the vertical through the posterior margin of the eye. The barbel is  $\frac{1}{3}$  as long as the upper jaw, or nearly so. Both jaws and the head of the vomer are armed with teeth in villiform bands, as in other species of the genus.

The pectorals are as long as the postorbital part of the head.

The ventrals extend nearly to the vent, and their length is contained 4 times in the distance from the tip of the snout to the end of the second dorsal.

The distance of the anal from the tip of the snout nearly equals the length of the anal base.

The origin of the anterior dorsal is directly over the axil of the pectoral; the dorsals are subcontinuous; none of the rays of the anterior



dorsal are produced, and none of them are longer than the longest rays of the second dorsal. The longest anal ray is not much more than half as long as the longest dorsal ray, and equals half the length of the pectorals. The length of the anterior dorsal base is about equal to that of the snout; the second dorsal base is about  $2\frac{1}{2}$  times as long as the ventral fin.

The length of the middle caudal rays is contained 8 times in the total length without caudal.

The typical specimens are 13 inches,  $13\frac{1}{2}$  inches, and 14 inches long, respectively.

*Radial formula*.—B. VII; D. 10, 60–63; A. 53–54; P. 15.

There are 21 or 22 rows of scales between the anterior dorsal and the lateral line, and about 155 along the lateral line.

*Color*.—Brown, with some light spots on the second dorsal and the sides; the anal fin and the two dorsals margined with darker brown.

## 2. *Phycis regius* (Walb.) Jor. & Gilb.

Col. Marshall McDonald, among numerous interesting forms of southern fishes, has recently secured 6 specimens of this species of *Phycis*, which were taken in a haul seine, March 26, 1880, at the mouth of the Cape Fear River, in North Carolina. These are numbered 90 in his collecting invoice. *Phycis regius* has not been recorded so far south before; specimens have been taken in York River, a tributary of Chesapeake Bay. The discovery of two gadoids as far south as the Cape Fear and Charleston is quite unexpected.

U. S. NATIONAL MUSEUM,

Washington, April 9, 1880.

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## DESCRIPTION OF A NEW SPECIES OF SEBASTICHTHYS (SEBASTICHTHYS MINIATUS), FROM MONTEREY BAY, CALIFORNIA.

By DAVID S. JORDAN and CHARLES H. GILBERT.

*Sebastichthys miniatus* sp. nov.

Allied to *Sebastichthys pinniger* Gill.

Body oblong, the form much as in *S. pinniger* and *S. atrovirens*; the caudal peduncle rather stouter than in *pinniger*. Head moderate, somewhat pointed, the profile not very steep. Mouth rather large, the maxillary reaching to opposite the middle of the pupil, the premaxillary in front on the level of the lower edge of the pupil. Lower jaw projecting somewhat beyond the upper, with a rather conspicuous symphyseal knob, which is larger than in *pinniger*. Middle of lower jaw elevated, so that the mesian teeth are much raised, and fit into an emargination

of the upper jaw. This elevation is much more marked in the present species than in *pinniger*.

Head more completely scaly than in related species, the scales also rougher, the scales on the mandible, snout, preorbital, and head generally being fully ctenoid. In *S. pinniger* the scales on nearly all parts of the head are cycloid. Mandible scaled even to the symphyseal knob. Interopercle fully scaled; most of the branchiostegals with series of scales. \* Maxillary, preorbital, and tip of snout fully scaled. Preorbital with a narrow neck, and two distinct spines, the neck less than one-fourth the diameter of the eye, which is of moderate size, about as in *pinniger*.

Spinous ridges on top of head low and small. The following pairs of spines are present: Nasal, preocular, supraocular, postocular, tympanic, and occipital, six pairs in all.

Interorbital space very broad and almost flat, a slight depression on each side of the supraocular ridge, between which depressions is a slight convexity.

In *S. pinniger* the interocular space is notably narrower, and both depressions and concavity are more marked. Space between occipital ridges slightly convex. In *S. pinniger* this is slightly concave.

Preopercular spines rather long and sharp, the second the longest and sharpest, the spines radiating and having less of a backward direction than in *S. pinniger*.

Opercular spines sharp. Spines on subopercle and interopercle moderate. Two suprascapular spines and a rudiment of a third.

Scales large, in about 47 transverse rows; the accessory scales few.

Dorsal fin low, rather deeply emarginate, essentially as in *S. pinniger*, but both spines and soft rays somewhat higher, the latter a little higher than the spines. Caudal fin lunate. Anal fin rather high, the second spine about as long as the third and rather stouter, little more than half the height of the soft rays. Pectoral fin moderate, as in *pinniger*, the tip reaching about to the vent, the base rather narrow, and the rays not fleshy. Ventrals, as in *pinniger*, very long, reaching past the vent almost to the beginning of the anal.

Dorsal rays XIII, 14; A. III, 7.

Gill-rakers, as in *pinniger*, very long and slender, about 10 + 22 in number, the longest about  $\frac{2}{3}$  the diameter of the eye.

Color darker than in *pinniger*, deep red, strictly speckled with dusky. Above bright deep vermilion, mottled with flesh-color on the sides, the belly light red. Back and sides everywhere with clusters of black dots, so that the whole body has a dusky shade. Top of head and back with vaguely defined cross-blotches made of dark points on snout, interorbital space, occiput, under fourth dorsal spine, under eighth dorsal spine, one under first soft ray, last soft ray, and base of caudal. Three obscure orange stripes radiating from the eye. Maxillary with a red streak.

Lips red, mottled with blackish. Under side of head light red, mottled with darker. Inside of mouth red.

Fins all bright vermilion; spinous dorsal spotted with olive-gray below, the membrane posteriorly edged with blackish; soft dorsal spotted below with blackish, a vertical dark olive streak on each membrane; other fins tipped with blackish, the membranes more or less dotted. No black blotch on the spinous dorsal; no distinct pale streak along the lateral line.

The coloration of *Sebastichthys pinniger*, which has thus far never been described, is as follows:

Ground color light olive-gray, profusely blotched with bright clear orange-red, the red shades predominating above, the pale below. Belly nearly white. Top of head with cross-blotches and marblings of orange, alternating with pale. Sides of the head flesh-colored, with three bright orange bands radiating from the eye; maxillary with orange touches. Lips pale, tinged with blackish. Inside of mouth pale.

Dorsal fin with the membranes bright orange, a large black blotch occupying the membranes between the seventh and tenth dorsal spines; this spot is usually distinct, but in old examples it is sometimes obsolete. Pectorals light red, mottled with yellowish. Other fins all bright orange, without dusky tips, slightly mottled with paler at base. Lateral line running in a distinct continuous light-gray streak, which is not crossed by the red markings.

*S. miniatus* was first known to us from two specimens taken at Santa Barbara. These were provisionally considered as representing a variety of *pinniger*, but after the examination of an extensive series of specimens from Monterey Bay we were forced to the conclusion that the deep-red forms, although nearly allied to *S. pinniger*, belong to a distinct species. The difference in color is very marked and the two species may be separated at sight. In life any of the numerous species of this genus may be at once recognized by the color alone, a feature which, circumstances of age and surroundings being equal, is in this group remarkably constant.

This species reaches the same size as *S. pinniger*, and is brought with it to the San Francisco market, but in much less abundance.

In the description already published by us of *Sebastichthys proriger* the specimen measured as "*S. pinniger*" belongs to the present species.

## Measurements.

	<i>Miniatus.</i> (Monterey.)	<i>Pinniger.</i> (Monterey.)
Extreme length, in inches.....	11. 00	16. 80
Length to base of caudal = 100 .....	9. 10	13. 50
Body:		
Greatest depth.....	35.	37. 5
Least depth of tail.....	12. 3	11. 8
Head:		
Length.....	36.	37. 5
Length of snout.....	.085	.09
Diameter of eye.....	.095	.095
Width of interorbital area.....	.08	.085
Occipital spine.....	.07	.07
Supraocular spine.....	.025	.04
Least width of preorbital.....	.017	.023
Maxillary.....	17. 5	17.
Longest gill-raker.....	.05	.063
Dorsal:		
Highest (fifth) spine.....	15. 5	16. 5
Longest soft ray.....	17. 3	18.
Anal:		
Length of base.....	15. 5	
Second spine.....	13. 5	11.
Third spine.....	14. 8	11. 5
Longest ray.....	21.	21. 5
Caudal, middle ray.....	17.	15.
Pectoral:		
Width of base.....	9. 5	
Length.....	28. 5	29.
Ventral, length.....	27.	26.
Dorsal rays.....	XIII, 14	XIII, 14
Anal rays.....	III, 7	III, 7
Scales in lateral line.....	42	48

**DESCRIPTION OF A NEW SPECIES OF "ROCK-FISH" (*SEBASTICHTHYS CARNATUS*), FROM THE COAST OF CALIFORNIA.**

**By DAVID S. JORDAN and CHARLES H. GILBERT.**

*Sebastichthys carnatus* sp. nov.

Allied to *Sebastichthys nebulosus* Ayres.

Body rather short and deep, tapering rapidly to a rather slender caudal peduncle. Head short, bluntish, the profile straight and steep. Mouth low and rather short, the maxillary extending to rather behind the posterior edge of the eye, which is rather small and elevated. Pre-maxillary entirely below the level of the eye, which is rather small and elevated. Mouth nearly horizontal, the jaws about equal, the lower jaw slightly shortest in the closed mouth. No prominent symphyseal knob.

Scales on the head rather rougher than in *S. nebulosus*; the lower jaw, maxillary, space in front of eye, and nasal region naked, as in *nebulosus*.

Top of head with the spinous ridges well developed, but somewhat lower than in *S. nebulosus*; otherwise very similar. The following pairs are present: Nasal, preocular, supraocular, tympanic, and occipital, five in all. The occipital spines especially are lower and narrower than in *nebulosus*.

Preopercular spines small and bluntish, the uppermost rather broader than the second, which is the longest. Opercular and suprascapular spines two each, rather short and broad. A slight spine on interopercle and subopercle.



Gill-rakers, as in *nebulosus*, short, compressed, somewhat clavate, the middle ones longer and somewhat crooked.

Spinous dorsal always higher than in *nebulosus*, the highest spines rather higher than the soft rays, the membranes more deeply incised than in *nebulosus*, but less than in *maliger*. Caudal fin truncate. Anal fin moderately high, the second spine stronger and slightly longer than the third, about two-thirds the height of the soft rays. Pectoral fins rather short, about reaching to the vent, their bases very broad, as in related species, and the lower rays thickened and fleshy. Ventrals reaching vent.

Scales in 53 transverse rows; the accessory scales rather numerous.

Dorsal, XIII, 12; anal III, 7; pyloric cæca 8; vertebræ 12 + 15.

Pattern of coloration almost exactly identical with that of *S. nebulosus*, but the shade of color very different.

In *S. carnatus* the light ground color is clear flesh color or pinkish, often tinged with grayish purple; the light shades on the head purplish. The dark shades are yellowish-brown, usually tinged with greenish.

In *S. nebulosus* the light ground color is more restricted, and its hue is usually a clear warm brownish-yellow with orange mottlings, varying to dusky orange-brown, below often tinged with olive. The dark shades are olive-black, varying to olive-brown. The light shades of *S. nebulosus* are often nearly identical with the dark shades of *S. carnatus*.

In both species the pattern is a light ground color, with dark blotches, the dark color predominating above. Membrane between third and fourth spines always pale, this color forming a blotch at the base of these spines, and then extending obliquely downwards and backwards, joining the ventral color. In front of this light area on the sides is a narrow oblique dark one, in front of which in turn is a light one, which begins at the angle of the opercle and divides, passing around the pectorals and uniting below them.

A light blotch under the eighth dorsal spine extending up on the fin; also another at the junction of the two dorsals, and still another under the last ray. Under each of these blotches irregular undulating light areas extend down the sides, either continuous or as detached blotches. The pale dorsal blotches correspond in position to the pink dorsal spots of *rosaceus*, *constellatus*, *oculatus*, and *chlorostictus*, and to pale areas found in *fasciolaris*, *vexillaris*, *maliger*, and other species.

Head above with cross-shades and bands radiating from the eye. Fins with the general pattern of color of neighboring parts of the body.

This species is very closely related to *S. nebulosus*, and from it cannot always be readily distinguished except by the color. Like *S. nebulosus*, it is one of the smaller species, seldom reaching a length of much over a foot. It is very abundant in the Bay of Monterey, forming a large proportion of the "rock-fish" shipped from Monterey to the San Francisco market. *S. nebulosus* occurs in the same waters, and the examination of great numbers of examples of both sexes and all ages has



convinced us that, although closely related, the two forms are permanently distinct. Whether hereafter to be regarded as a species or as a "subspecies," the form is a peculiar one, and as such worthy of a name.

Measurements.

	<i>Carnatus.</i> (Monterey.)	<i>Nebulosus.</i> (Monterey.)
Extreme length, in inches.....	10.50	11.50
Length to base caudal = 100.....	8.90	9.85
Body:		
Greatest depth.....	38.	36.5
Least depth.....	11.5	11.5
Head:		
Length.....	36.	36.
Diameter of eye.....	8.5	9.
Length of snout.....	9.5	10.
Length of preocular ridge.....	3.5	3.5
Length of supraocular ridge.....	5.	5.
Length of occipital ridge.....	6.	6.
Least width of preorbital.....	2.5	3.
Width of interorbital space.....		6.3
Length of maxillary.....	18.	18.
Length of longest gill-raker.....	2.8	2.
Dorsal:		
Length of base.....	57.	63.
Height of fifth spine.....	20.	16.
Height of membrane between fourth and fifth spines.....	11.	11.2
Height of longest soft ray.....	15.8	15.5
Anal:		
Length of base.....	14.	13.7
Height of second spine.....	16.5	13.
Height of third spine.....	14.5	13.1
Height of longest ray.....	20.	17.5
Caudal, length of middle rays.....	20.5	16.3
Pectoral:		
Length.....	25.	26.8
Width of base.....	11.	10.5
Ventral, length.....	24.	21.
Dorsal rays.....	XIII, 13	XIII, 14
Anal rays.....	III, 7	III, 7
Number of transverse rows of scales.....	43	45

APRIL 2, 1880.

CHECK-LIST OF DUPLICATES OF NORTH AMERICAN FISHES  
DISTRIBUTED BY THE SMITHSONIAN INSTITUTION IN BEHALF  
OF THE UNITED STATES NATIONAL MUSEUM, 1877-1880.

Prepared by TARLETON H. BEAN.

LOPHIIDÆ.

1. *Lophius piscatorius* Linn.

*Lophius americanus* Storer, Hist. Fish. Mass., 1867, p. 101, pl. xviii, fig. 2.

22311. Gloucester, Massachusetts.

ANTENNARIIDÆ.

2. *Pterophryne histrio* Linn.

*Pterophryne levigata* (Cuv.) Gill, Cat. Fish. E. Coast N. A., 1873, p. 14.

20662. Wood's Holl, Massachusetts (3).

DIODONTIDÆ.

3. *Diodon hystrix* Linn.

23779. Bermuda.

4. *Chilomycterus geometricus* (Linn.) Kaup.

9448. East coast of United States.

14752. Noank, Connecticut.

19460. Eastern shore of Virginia.

19674. Beaufort, North Carolina.

19719. Fort Macon, North Carolina.

19767. Eastern shore of Virginia.

20074. Coast of New England.

21634. Newport, Rhode Island.

22911. Eastern coast of United States.

22912. " "

## TETRODONTIDÆ.

5. *Tetrodon turgidus* Mitch.*Chilichthys turgidus* Gill, Cat. Fish. E. Coast N. A., 1873, p. 15.

10740.	Wood's Holl, Massachusetts.	17601.	Noank, Connecticut.
14037.	Noank, Connecticut.	17602.	" "
14746.	" "	17603.	" "
14747.	" "	17604.	" "
14748.	" "	17605.	" "
14749.	" "	17606.	" "
14750.	" "	17607.	" "
14828.	" "	19461.	Eastern shore of Virginia.
14972.	Eastern coast of United States.	19765.	" "
17596.	Noank, Connecticut.	19829.	Wood's Holl, Massachusetts.
17597.	" "	20250.	Eastern coast of United States.
17598.	" "	21444.	Cohasset Narrows, Massachusetts.
17599.	" "	22718.	Eastern coast of United States.
17600.	" "	23147.	" "

## BALISTIDÆ.

6. *Alutera Schoepfi* (Walb.) Goode & Bean.*Alutera cuspidata* Gill, Cat. Fish. E. Coast N. A., 1873, p. 15.*Ceratacanthus aurantiacus* Gill, op. cit., p. 15.

14745.	Wood's Holl, Massachusetts.	18745.	Wood's Holl, Massachusetts.
16601.	Menemsha Bight, Massachusetts.	18746.	" "
16314.	Wood's Holl, Massachusetts.	18747.	" "
16567.	" "	18748.	" "
18715.	" "	18749.	" "
18716.	" "	18750.	" "
18717.	" "	18751.	" "
18718.	" "	18752.	" "
18719.	" "	18753.	" "
18734.	" "	18863.	" "
18735.	" "	19251.	" "
18736.	" "	19280.	" "
18737.	" "	19282.	" "
18738.	" "	19718.	Fort Macon, North Carolina.
18739.	" "	20691.	Newport, Rhode Island.
18740.	" "	21644.	" "
18741.	" "	21649.	" "
18742.	" "	22937.	Eastern coast of United States.
18743.	" "	22738.	" "
18744.	" "		

7. *Monacanthus setifer* Bennett.*Stephanolepis setifer* Gill, Cat. Fish. E. Coast N. A., 1873, p. 15.

18893.	Wood's Holl, Massachusetts.	18908.	Wood's Holl, Massachusetts.
18894.	" "	18909.	" "
18895.	" "	18910.	" "
18896.	" "	18911.	" "
18897.	" "	18912.	" "
18898.	" "	18913.	" "
18899.	" "	18914.	" "
18900.	" "	18915.	" "
18901.	" "	18916.	" "
18902.	" "	18917.	" "
18903.	" "	18946.	" "
18904.	" "	21545.	Charleston, South Carolina.
18905.	" "	21631.	Newport, Rhode Island.
18906.	" "	23144.	Wood's Holl, Massachusetts.
18907.	" "		

8. *Balistes capriscus* Linn.

21650. Newport, Rhode Island.

| 22739. Eastern coast of United States.

9. *Balistes vetula* Linn.

22731. Eastern coast of United States.

SYNGNATHIDÆ.

10. *Syngnathus fuscus* Storer.

18919. Wood's Holl, Massachusetts.  
18920. " "  
18921. " "  
18922. " "  
18923. " "  
18924. " "  
18925. " "  
18926. " "  
18927. " "  
18928. " "  
18929. " "  
18930. " "  
18931. " "

18932. Wood's Holl, Massachusetts.  
18933. " "  
18934. " "  
18935. " "  
18936. " "  
18937. " "  
18938. " "  
18939. " "  
18940. " "  
18941. " "  
18942. " "  
18943. " "

GASTEROSTEIDÆ.

11. *Gasterosteus aculeatus* L.

13397. Wood's Holl, Massachusetts.  
19831. " "  
21455. " "

23162. Wood's Holl, Massachusetts.  
24433. Wilmington, Delaware.

12. *Gasterosteus pungitius* L.

23161. Wood's Holl, Massachusetts.

| 24460. Wood's Holl, Massachusetts.

13. *Gasterosteus pungitius* L. sub. sp. *brachypoda* Bean.

21767. American Harbor, Cumberland Gulf.  
21769. " "

| 21770. American Harbor, Cumberland Gulf.  
21772. " "

14. *Apeltes quadracus* (Mitch.) Brevoort.

13404. Wood's Holl, Massachusetts.  
13413. " "  
13418. " "  
14002. Noank, Connecticut.

| 16110. Wood's Holl, Massachusetts.  
17753. " "  
19832. " "  
23160. " "

SOLEIDÆ.

15. *Solea vulgaris* Quensel.

22734. England.

16. *Achirus lineatus* (Linn.) Cuv.

7280. Washington, District of Columbia.  
10365. Potomac River.  
12984. New Bedford, Massachusetts.  
15091. Tompkinsville, New York.  
15350. Eastern coast of United States.  
15628. New York Market.  
19759. Eastern coast of the United States.  
19876. Potomac River.

| 19877. Potomac River.  
19878. " "  
19916. Eastern coast of the United States.  
20199. Newport, Rhode Island.  
20756. " "  
22621. Potomac River.  
23472. Chesapeake Bay.  
24249. Providence, Rhode Island.

## PLEURONECTIDÆ.

17. *Pseudopleuronectes americanus* (Walb.) Gill.

14601.	Portland, Maine.	14726.	Wood's Holl, Massachusetts.
14602.	" "	14727.	" "
14693.	" "	14728.	" "
14694.	" "	14729.	" "
14695.	" "	14730.	" "
14696.	" "	14731.	" "
14697.	" "	14732.	" "
14699.	" "	14733.	" "
14700.	" "	14734.	" "
14701.	" "	14735.	" "
14702.	" "	14738.	" "
14704.	Wood's Holl, Massachusetts.	14739.	" "
14706.	" "	14740.	" "
14707.	" "	14741.	" "
14708.	" "	17231.	" "
14709.	" "	17232.	" "
14710.	" "	17233.	" "
14711.	" "	17234.	" "
14712.	" "	17235.	" "
14714.	" "	17236.	" "
14716.	" "	17237.	" "
14717.	" "	17238.	" "
14718.	" "	17239.	" "
14719.	" "	17240.	" "
14721.	" "	20868.	New York Market.
14722.	" "	20874.	Washington Mk't, from Portland, Me.
14723.	" "	20953.	Bucksport, Maine.
14724.	" "	22730.	Eastern Coast of United States.
14725.	" "	23179.	Gloucester, Massachusetts.

18. *Limanda ferruginea* (Storer) Goode & Bean.

21020.	Halifax, Nova Scotia.	22323.	Gloucester, Massachusetts.
21033.	" "	22691.	Milk Island Trap, Gloucester, Mass.
21051.	" "	24625.	Halifax, Nova Scotia.
21504.	Salem, Massachusetts.	24626.	Gulf of Maine.
21902.	Gloucester, Massachusetts.		

19. *Pleuronectes glaber* (Storer) Gill.

14657.	Portland, Maine.	14683.	Portland, Maine.
14658.	" "	14684.	" "
14660.	" "	14685.	" "
14661.	" "	17163.	" "
14662.	" "	17164.	" "
14663.	" "	17165.	" "
14665.	" "	17166.	" "
14666.	" "	17167.	" "
14667.	" "	17168.	" "
14668.	" "	17169.	" "
14669.	" "	17170.	" "
14670.	" "	17171.	" "
14671.	" "	17172.	" "
14672.	" "	17173.	" "
14673.	" "	20903.	Washington Market.
14677.	" "	20904.	" "
14679.	" "	20954.	Bucksport, Maine.
14680.	" "	22241.	Washington Market, from Portland, Me.

20. *Glyptocephalus cynoglossus* (Linn.) Gill.

21000.	Massachusetts Bay.	21817.	Gloucester, Massachusetts.
21001.	Le Have Bank.	21821.	" "
21005.	Halifax, Nova Scotia.	21908.	" "
21019.	" "	22694.	Milk Island Trap, Gloucester, Mass.
21032.	Mouth of Harbor, Halifax, N. S.	23141.	Massachusetts Bay.
21047.	Halifax, Nova Scotia.	24632.	Chebucto Head, Nova Scotia.
21060.	Le Have Bank.		

**21. *Lophopsetta maculata* (Mitch.) Gill.**

14633.	Wood's Holl, Massachusetts.	17154.	Noank, Connecticut.
14634.	" "	17155.	" "
14636.	" "	17156.	" "
14638.	Portland, Maine.	17157.	" "
14639.	Noank, Connecticut.	17158.	" "
14640.	" "	17159.	" "
14641.	" "	17160.	Charleston, South Carolina.
14642.	" "	17161.	Noank, Connecticut.
14643.	" "	17162.	" "
14644.	" "	19429.	Wood's Holl, Massachusetts.
14647.	" "	19753.	Eastern coast of United States.
14648.	" "	22313.	Gloucester, Massachusetts.
14649.	" "	22372.	Wood's Holl, Massachusetts.
14652.	" "	22693.	Gloucester, Massachusetts.
14653.	" "	22735.	Eastern coast of United States.
14654.	" "	22759.	Wood's Holl, Massachusetts.
14655.	" "	23763.	Off Cape Cod, Massachusetts.
16002.	Wood's Holl, Massachusetts.	24221.	Gloucester, Massachusetts.
17151.	Eastport, Maine.	24262.	Vineyard Sound, Massachusetts.
17152.	Noank, Connecticut.	24349.	Provincetown, Massachusetts.
17153.	" "		

**22. *Citharichthys spilopterus* Gthr. ?**

23529. Crisfield, Maryland.

**23. *Hippoglossoides platessoides* (Fabr.) Gill.**

21009.	Halifax, Nova Scotia.	23142.	Massachusetts Bay.
21021.	" "	23920.	Sable Island.
21023.	" "	24602.	Massachusetts Bay.
21037.	" "	24606.	Halifax, Nova Scotia.
21045.	" "	24607.	" "
21046.	Off Halifax, Nova Scotia.	24609.	" "
21052.	Halifax, Nova Scotia.	24611.	" "
21064.	" "	24612.	" "
21065.	" "	24619.	" "
21785.	Gloucester, Massachusetts.	24621.	" "
21818.	" "	24627.	" "
22288.	Lat. 42° 49' N., Lon. 62° 55' W.	24633.	" "
22629.	Gloucester, Massachusetts.	24634.	" "

**24. *Pseudorhombus dentatus* (Linn.) Gthr.**

*Chænopsetta ocellaris* (DeKay) Gill.

*Chænopsetta dentata* (Storer) Gill.

14628.	Noank, Connecticut.	18447.	Saint John's River, Florida.
14629.	" "	18531.	Kinston, North Carolina.
14630.	" "	18532.	" "
16029.	Wood's Holl, Massachusetts.	19397.	Wood's Holl, Massachusetts.
16318.	" "	19398.	" "
17114.	Charleston, South Carolina.	19501.	Beaufort, North Carolina.
18442.	Saint John's River, Florida.	20982.	Charleston, South Carolina.
18443.	" "	21279.	Saint John's River, Florida.
18444.	" "	22717.	Eastern coast of United States.
18445.	" "	22908.	" "
18446.	" "	23528.	Crisfield, Maryland.

**25. *Pseudorhombus oblongus* (Mitch.) Gthr.**

*Chænopsetta oblonga* (Mitch.) Gill.

10677.	Wood's Holl, Massachusetts.	14624.	Noank, Connecticut.
10678.	" "	14625.	" "
10679.	" "	14626.	" "
10682.	" "	14627.	" "
10683.	" "	19299.	Wood's Holl, Massachusetts.
10716.	" "	24365.	Provincetown, Massachusetts.



**26. Hippoglossus vulgaris Flem.**

23394. Jeffrey's Bank.

| 24242. Jeffrey's Bank.

## MACRURIDÆ.

**27. Macrurus Bairdii Goode & Bean.**

23140. Grand Banks.

| 24313. Gloucester, Massachusetts.

**28. Macrurus Fabricii Sundeval.**

21615. Lat. 42° 46' N., Lon. 63° 45' W.

21783. Off coast of New England.

21806. Lat. 43° 53' N., Lon. 59° 05' W.

22280. Off coast of New England.

22646. " "

22747. Sable Island Bank.

22748. " "

22872. Off coast of New England.

22873. " "

22875. " "

22876. " "

23054. Banquereau.

23055. Banquereau.

23057. Lat. 44° 20' N., Lon. 57° 57' W.

23058. " "

23059. " "

23060. " "

23061. " "

23909. Off coast of New England.

24285. " "

24286. " "

24702. " "

24703. " "

## GADIDÆ.

**29. Pollachius carbonarius (Linn.) Bonn.**

14615. Eastport, Maine.

14616. " "

14617. " "

14618. " "

14621. " "

| 21794. Gloucester, Massachusetts.

22690. " "

22796. " "

24219. " "

24451. Wood's Holl, Massachusetts.

**30. Gadus morrhua Linn.**

22215. Noman's Land.

22770. Wood's Holl, Massachusetts.

22837. Gloucester, Massachusetts.

23156. " "

23166. " "

23764. Provincetown, Massachusetts.

| 24217. Provincetown, Massachusetts.

24218. " "

24347. " "

24380. " "

24419. Gloucester, Massachusetts.

25212. Wood's Holl, Massachusetts.

**31. Microgadus tomcodus (Walb.) Gill.**

10778. Wood's Holl, Massachusetts.

10779. " "

13015. " "

13019. " "

13835. " "

14009. Noank, Connecticut.

14590. Eastport, Maine.

14591. " "

14592. " "

14594. Portland, Maine.

14597. Wood's Holl, Massachusetts.

14598. " "

14599. " "

14600. " "

14601. " "

14602. " "

14603. " "

| 14604. Wood's Holl, Massachusetts.

14605. " "

14606. " "

14607. " "

14608. " "

14609. " "

14610. " "

17611. " "

17746. " "

20595. " "

21454. " "

22221. " "

23158. " "

24445. " "

24457. " "

24513. " "

**32. Phycis chuss (Walb.) Gill.**

22630. Gloucester, Massachusetts.

**33. *Phycis tenuis* (Mitch.) DeKay.**

10450.	Eastport, Maine.	19176.	Wood's Holl, Massachusetts.
14568.	Wood's Holl, Massachusetts.	19756.	Eastern coast of United States.
14569.	" "	21018.	Halifax, Nova Scotia.
14573.	Eastport, Maine.	21616.	Lat. 42° 42' N., Lon. 64° 20' W.
14575.	Portland, Maine.	21790.	Gloucester, Massachusetts.
14576.	" "	21796.	" "
14577.	" "	21816.	" "
14578.	" "	22321.	" "
14582.	" "	22631.	" "
14583.	" "	22653.	" "
14584.	" "	22701.	" "
14585.	" "	22722.	New England.
19164.	Wood's Holl, Massachusetts.	24373.	Provincetown, Massachusetts (14).
19166.	" "	24443.	Wood's Holl, Massachusetts.
19169.	" "	24464.	" "
19172.	" "	24574.	" "
19174.	" "	24610.	Halifax, Nova Scotia.

**34. *Phycis regius* (Walb.) Jordan & Gilbert.**

16845.	New York Aquarium.	20923.	East coast of United States.
16847.	East coast of United States.		

**35. *Onos* (*Rhinonemus*) *cimbrius* (L.) Goode & Bean.**

23149.	Gloucester, Massachusetts.	23761.	Provincetown, Massachusetts.
23180.	Halifax, Nova Scotia.		

**36. *Haloporphyrus viola* Goode & Bean.**

23062.	Lat. 44° 20' N., Lon. 57° 57' W.	24713.	Lat. 43° 17' N., Lon. 51° 25' W.
23063.	" "	24714.	Grand Banks, western edge.
23918.	Grand Banks.	24746.	Banquereau.
24251.	Lat. 43° 41' N., Lon. 59° 15' W.	24747.	Lat. 59° 04' N., Lon. 43° 56' W.
24301.	Lat. 44° 13' N., Lon. 58° 02' W.		

**37. *Lota maculosa* (LeS.) Rich.**

11019.	Sandusky, Ohio.	15860.	New York Market.
11020.	" "	16637.	" "
11022.	" "	16638.	" "
11024.	" "	16639.	" "
11201.	Alpena, Michigan.	16640.	" "
11202.	" "	17782.	Sandusky, Ohio.
11203.	" "	17783.	" "
12452.	Apostle Island, Lake Superior.	19793.	Alpena, Michigan.
12466.	" "	22926.	Lake Superior.

MERLUCIDÆ.

**38. *Merlucius bilinearis* (Mitch.) Gill.**

13010.	Wood's Holl, Massachusetts.	18731.	Wood's Holl, Massachusetts.
14560.	Portland, Maine.	18732.	" "
14561.	Eastport, Maine.	18733.	" "
14562.	" "	19757.	" "
14563.	" "	19846.	" "
14564.	Wood's Holl, Massachusetts.	19867.	" "
14565.	" "	20848.	Noman's Land.
14566.	" "	21055.	Halifax, Nova Scotia.
14952.	Eastern coast of United States.	21793.	Gloucester, Massachusetts.
16797.	New Bedford, Massachusetts.	22649.	" "
18705.	Wood's Holl, Massachusetts.	22698.	" "
18706.	" "	23154.	Wood's Holl, Massachusetts.
18707.	" "	24240.	Lat. 42° 53' N., Lon. 69° 14' W.
18708.	" "	24241.	Jeffrey's Bank.
18709.	" "	24268.	Lat. 42° 53' N., Lon. 69° 14' W.
18710.	" "	24525.	Wood's Holl, Massachusetts.
18711.	" "	24715.	Lat. 42° 53' N., Lon. 69° 14' W.
18730.	" "		

## LYCODIDÆ.

39. *Lycodes VahlII* Reinh.

24239. East Banquereau.

40. *Zoarces anguillaris* (Peck) Storer.

14553. Eastport, Maine.

14554. " "

14556. " "

14557. Portland, Maine.

14558. " "

14559. " "

21784. Gloucester, Massachusetts.

22632. " "

22658. " "

22695. " "

22871. Gloucester, Massachusetts.

23084. " "

23193. Massachusetts Bay.

23760. Provincetown, Massachusetts.

23910. " "

24222. " "

24311. " "

24346. " "

24382. " "

## CRYPTACANTHIDÆ.

41. *Cryptacanthodes maculatus* Storer.

21433. Eastern coast of United States.

21857. Gloucester, Massachusetts.

21254. Fishing Banks, off New England.

24255. Fishing Banks, off New England.

24710. " "

24737. " "

## XIPHIDIONTIDÆ.

42. *Murænoïdes gunnellus* (L.) Goode & Bean.*Murænoïdes mucronatus* (Mitch.) Gill

13429. Wood's Holl, Massachusetts.

13432. " "

13438. " "

13848. Eastport, Maine.

16503. Eastern coast of United States.

19827. Wood's Holl, Massachusetts.

19847. Wood's Holl, Massachusetts.

22842. " "

23164. New Bedford, Massachusetts.

23165. Wood's Holl, Massachusetts.

24926. " "

## ANARRHICHADIDÆ.

43. *Anarrhichas lupus* L.

23906. East coast of United States.

23907. " "

24234. Lat. 42° 10' N., Lon. 66° 30' W.

24235. 8 miles S. E. Gloucester, Massachusetts.

24699. 5 miles S. S. E. Gloucester, Massachusetts.

24700. " "

44. *Anarrhichas minor* Olafsen.

24233. Lat. 41° 30' N., Lon. 57° 10' W., 250 fths. | 24237. Lat. 43° 52' N., Lon. 59° 09' W., 200 fths.

45. *Anarrhichas latifrons* Steenstrup & Hallg.

21623. Lat. 42° 27' N., Lon. 64° 20' W., 280 fathoms. | 24238. Lat. 42° 53' N., Lon. 59° 09' W., 200 fths.

21845. Banquereau, 300 fathoms.

22710. East coast of United States.

24698. Lat. 43° 33' N., Lon. 52° 06' W., 150 fths.  
25109. Lat. 43° 33' N., Lon. 52° 06' W., 140 to 160 fathoms.

## BLENNIIDÆ.

46. *Blennius crinitus*.

21959. Bermuda.

47. *Labrosomus nuchipinnis* (Q. & G.) Poey.

21240. Bermuda.

| 21946. Bermuda

## BATRACHIDÆ.

48. *Batrachus tau* Linn.

6823.	East coast of United States.
10711.	Wood's Holl, Massachusetts.
10743.	" "
10744.	" "
14542.	Noank, Connecticut.
14543.	" "
14544.	" "
14545.	" "
14546.	" "
14548.	" "
14549.	" "
14550.	" "
14551.	" "
14552.	" "
16550.	Wood's Holl, Massachusetts.

17210.	Noank, Connecticut.
17211.	" "
17212.	" "
17213.	" "
17214.	" "
17215.	" "
17216.	" "
17217.	" "
17218.	" "
17219.	" "
17609.	Wood's Holl, Massachusetts.
19758.	East coast of United States.
20632.	Wood's Holl, Massachusetts.
22760.	" "

49. *Porichthys porosissimus*.

6669.	West coast of United States.
9316.	San Diego, California.
17046.	Santa Barbara, California.

20005.	Santa Barbara, California.
22333.	Monterey, California.
24814.	San Diego, California.

## URANOSCOPIDÆ.

50. *Astroscoptes anoplus* (C. & V.) Brevoort.

7304.	Eastern United States.
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## CYCLOPTERIDÆ.

51. *Cyclopterus lumpus* Linn.

20698.	Newport, Rhode Island.
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23051.	Gloucester, Massachusetts.
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## GOBIIDÆ.

52. *Gobius saporator*.

21935.	Bermuda.
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53. *Eleotris*.

19880	?
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19882	?
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54. *Dormitator*.

19881	?
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## TRIGLIDÆ.

55. *Dactylopterus volitans* (Linn.) Lac.

18579.	Wood's Holl, Massachusetts.
18580.	" "
18581.	" "
18582.	" "
18583.	" "
18584.	" "
18585.	" "
18586.	" "
18587.	" "
18588.	" "
18589.	" "
18590.	" "
18591.	" "
18592.	" "
18593.	" "
18594.	" "
18595.	" "
18596.	" "
18597.	" "
18598.	" "

18599.	Wood's Holl, Massachusetts.
18600.	" "
18601.	" "
18602.	" "
18603.	" "
18605.	" "
18606.	" "
18607.	" "
18608.	" "
18609.	" "
18610.	" "
18611.	" "
18612.	" "
18613.	" "
18614.	" "
18615.	" "
18616.	" "
18617.	" "
18618.	" "
18619.	" "

18620.	Wood's Holl, Massachusetts.
18622.	" "
18623.	" "
18624.	" "
18625.	" "
18626.	" "
18627.	" "
18628.	" "
18629.	" "
18630.	" "
18631.	" "
18632.	" "
18633.	" "
18634.	" "
18635.	" "
18636.	" "
18637.	" "
18638.	" "
18639.	" "
18640.	" "
18643.	" "
18644.	" "
18645.	" "
18646.	" "
18647.	" "
18648.	" "
18649.	" "
18650.	" "
18651.	" "
18652.	" "
18653.	" "
18654.	" "

18655.	Wood's Holl, Massachusetts.
18656.	" "
18657.	" "
18658.	" "
18659.	" "
18660.	" "
18661.	" "
18662.	" "
18663.	" "
18664.	" "
18665.	" "
18666.	" "
18667.	" "
18668.	" "
18669.	" "
18670.	" "
18671.	" "
18672.	" "
18673.	" "
18674.	" "
18676.	" "
18677.	" "
18678.	" "
18679.	" "
18680.	" "
18681.	" "
18682.	" "
18683.	" "
18684.	" "
20835.	" "
24481.	" "
24497.	" "

56. *Prionotus evolans* (L.) Gill.

13575.	Wood's Holl, Massachusetts.
13581.	" "
14534.	" "
14535.	Noank, Connecticut.
14536.	" "
14537.	" "
14538.	" "
14539.	" "
14540.	" "
14955.	Wood's Holl, Massachusetts.
16004.	" "
16008.	" "
16009.	" "
16011.	" "
16503.	" "
18868.	" "
18869.	" "
18870.	" "

18871.	Wood's Holl, Massachusetts.
18872.	" "
18873.	" "
18874.	" "
18875.	" "
18876.	" "
18877.	" "
18878.	" "
18879.	" "
19307.	" "
19308.	" "
19310.	" "
20703.	Newport, Rhode Island.
21442.	Wood's Holl, Massachusetts.
21652.	Newport, Rhode Island.
22713.	East coast of United States.
22750.	Wood's Holl, Massachusetts.
22754.	" "

57. *Prionotus carolinus* (Linn.) C. & V.

14528.	Noank, Connecticut.
14529.	" "
14530.	" "
14531.	" "
14532.	" "
14533.	" "
16032.	Wood's Holl, Massachusetts.
16309.	" "
17142.	Noank, Connecticut.
17143.	" "
17144.	" "

17145.	Noank, Connecticut.
17146.	" "
17147.	" "
17148.	" "
17149.	" "
17150.	" "
19341.	Wood's Holl, Massachusetts.
19342.	" "
19343.	" "
19344.	" "
19345.	" "



v2

19346. Wood's Holl, Massachusetts.  
19347. " "  
19348. " "  
19349. " "  
19350. " "  
19352. " "  
19353. " "  
19354. " "  
19356. " "  
19357. " "  
19358. " "  
19400. " "  
19401. " "

19403. Wood's Holl, Massachusetts.  
19404. " "  
19405. " "  
19406. " "  
19407. " "  
19408. " "  
19409. " "  
19410. " "  
19415. " "  
20664. " "  
21443. Cohasset Narrows, Massachusetts.  
23531. Crisfield, Maryland.

# AGONIDÆ.

## 58. *Aspidophoroides monopterygius* (Bloch) Storer.

23174. Massachusetts Bay.

| 24336. Provincetown, Massachusetts.

# COTTIDÆ.

## 59. *Cottus octodecimspinosus* Mitch.

14514. Portland, Maine.  
14515. " "  
14516. " "  
14518. " "  
14519. " "  
14520. " "  
14522. " "  
14523. " "  
14525. " "  
14526. " "  
19186. Wood's Holl, Massachusetts.  
19187. " "

19188. Wood's Holl, Massachusetts.  
19189. " "  
19190. " "  
19191. " "  
19192. " "  
19193. " "  
19194. " "  
19195. " "  
19749. Coast of Massachusetts.  
21036. Halifax, Nova Scotia.  
21507. Salem, Massachusetts.  
22266. Gloucester, Massachusetts.

## 60. *Cottus æneus* Mitch.

10365. Wood's Holl, Massachusetts.  
10367. " "  
13516. " "  
13522. " "  
13525. " "  
13530. " "  
13541. " "

15093. Tompkinsville, New York.  
16185. Noank, Connecticut.  
20883. Wood's Holl, Massachusetts.  
20889. " "  
21457. " "  
22766. " "  
23159. " "

## 61. *Cottus scorpius* L., subsp. *grönlandicus* C. & V.

*Cottus grönlandicus* Cuv. & Val.

14507. Portland, Maine.  
14509. " "  
14510. " "  
14511. Eastport, Maine.

| 21506. Salem, Massachusetts.  
22314. Gloucester, Massachusetts.  
22648. " "

## 62. *Cottus scorpioides* Fabr.

21744. Cumberland Gulf.

| 22331. Cumberland Gulf.

## 63. *Centridermichthys uncinatus* (Rht.) Günth.

24340. East coast of United States.

## 64. *Gymnacanthus pistilliger* (Pall.) Gill MSS.

21732. Disco Island, Greenland.  
21735. " "

| 21741. Niantic Harbor, Cumberland Gulf.

## HEMITRIPTERIDÆ.

65. *Hemitripterus americanus* (Gmel.) Storer.

14497.	Eastport, Maine.	20956.	Bucksport, Maine.
14499.	" "	21010.	Halifax, Nova Scotia.
14500.	Portland, Maine.	21026.	" "
14502.	" "	21035.	" "
14503.	" "	21508.	Salem, Massachusetts.
14504.	Noank, Connecticut.	21646.	Newport, Rhode Island.
14505.	Wood's Holl, Massachusetts.	21795.	Gloucester, Massachusetts.
14959.	Coast of Massachusetts.	22269.	" "
16438.	Boston, Massachusetts.	22283.	" "
16514.	Nantucket, Rhode Island.	22315.	" "
16558.	" "	22647.	" "
16594.	Wood's Holl, Massachusetts.	22655.	" "
19412.	" "	22699.	" "
19413.	" "	22839.	" "
19414.	" "	22843.	Wood's Holl, Massachusetts.
19748.	" "	24368.	Grand Banks.
20696.	Newport, Rhode Island.		

## SCORPÆNIDÆ.

66. *Sebastes marinus* Linn.*Sebastes viviparus* Kröyer.

14472.	Eastport, Maine.	21792.	Gloucester, Massachusetts.
14473.	" "	21811.	" "
14474.	" "	22267.	" "
14476.	" "	22298.	East coast of United States.
14477.	" "	22299.	" "
14478.	" "	22651.	Gloucester, Massachusetts.
14479.	" "	22700.	" "
14480.	" "	22882.	East coast of United States.
14484.	" "	23092.	" "
14486.	" "	23143.	Massachusetts Bay.
14488.	" "	23774.	" "
14489.	" "	23775.	" "
14490.	" "	23911.	Banquereau.
14495.	" "	24637.	Halifax, Nova Scotia.
14496.	" "		
21620.	Lat. 42° 42' N., Lon. 64° 20' W., 270 to 300 fathoms.		

67. *Sebastes melanops* (Grd.) Gill.

21582. Washington Territory.

## SCARIDÆ.

68. *Scarus radians* Val.

21373. Bermuda.

| 21882. Bermuda.

69. *Pseudoscarus vetula* (Schn.) Gill.

21880. Bermuda.

## LABRIDÆ.

70. *Chærojulis radiatus* (L.) Goode.

21879. Bermuda.

71. *Tautoga onitis* (Linn.) Gthr.

10598.	Wood's Holl, Massachusetts.
10599.	" "
10643.	" "
13630.	" "
14446.	" "
14453.	Noank, Connecticut.
14454.	" "
14455.	" "
14456.	" "
14457.	" "
14458.	" "
14459.	" "
14460.	" "
14461.	Wood's Holl, Massachusetts.
14462.	" "
14463.	" "
14464.	" "
14466.	" "
14467.	" "
17610.	" "
17611.	" "
17612.	" "

17613.	Wood's Holl, Massachusetts.
17614.	" "
17615.	" "
17616.	" "
17618.	" "
17619.	" "
17620.	" "
17621.	" "
17622.	" "
22725.	" "
22769.	" "
22914.	Massachusetts Bay.
22915.	" "
22916.	" "
24438.	Wood's Holl, Massachusetts.
24444.	" "
24447.	" "
24455.	" "
24473.	" "
24507.	" "
24519.	" "
24572.	" "

72. *Tautogolabrus adspersus* (Walb.) Gill.

10745.	Wood's Holl, Massachusetts.
10746.	" "
14431.	Portland, Maine.
14432.	" "
14433.	" "
14434.	" "
14435.	" "
14436.	" "
14438.	" "
14439.	" "
14440.	" "
14441.	" "
14442.	" "
14443.	" "
14444.	" "
14445.	" "
14446.	Noank, Connecticut.
14447.	" "
14448.	" "
14449.	" "
14450.	" "
14452.	" "
16034.	Wood's Holl, Massachusetts.

17555.	Noank, Connecticut.
17556.	" "
17557.	" "
17558.	" "
17559.	" "
17560.	" "
17561.	" "
17562.	" "
17563.	" "
17564.	" "
17617.	Wood's Holl, Massachusetts.
17623.	Noank, Connecticut.
17624.	" "
17625.	" "
17626.	" "
17627.	" "
17628.	" "
17629.	" "
22652.	Gloucester, Massachusetts.
22742.	" "
22767.	Wood's Holl, Massachusetts.
23908.	Provincetown, Massachusetts.

73. *Oxyjulis modestus* (Grd.) Gill.

17025.	Santa Barbara, California.
--------	----------------------------

17027.	Santa Barbara, California.
--------	----------------------------

POMACENTRIDÆ.

74. *Glyphidodon saxatilis* (L.) C. & V.

10333.	Bermuda.
16856.	" "
18207.	" "
18208.	" "
18209.	" "
18210.	" "
18211.	" "
18212.	" "

18213.	Bermuda.
18214.	" "
18215.	" "
18216.	" "
18217.	" "
18218.	" "
21984.	" "

## CICHLIDÆ.

75. *Heros*.

- |                                       |  |                                       |
|---------------------------------------|--|---------------------------------------|
| 19908. West coast of Central America. |  | 19910. West coast of Central America. |
|---------------------------------------|--|---------------------------------------|

## EMBIOTOCIDÆ.

76. *Embiotoca Jacksoni* Ag.

- |                                   |  |                    |
|-----------------------------------|--|--------------------|
| 17048. Santa Barbara, California. |  | 22255. California. |
| 17049. " "                        |  |                    |

77. *Tænietoca lateralis* (Ag.) A. Ag.

- |                             |  |                    |
|-----------------------------|--|--------------------|
| 6216. Presidio, California. |  | 22259. California. |
| 22256. California.          |  | 22304. "           |

78. *Holconotus rhodoterus* Ag.

- |                                       |  |                                   |
|---------------------------------------|--|-----------------------------------|
| 566. Presidio, California.            |  | 17030. Santa Barbara, California. |
| 567. Humboldt Bay.                    |  | 17031. " "                        |
| 572. San Diego, California.           |  | 17032. " "                        |
| 17028. Santa Barbara, California.     |  | 17033. " "                        |
| 17029. Santa Cruz Island, California. |  | 20340. California.                |

## CHÆTODONTIDÆ.

79. *Sarathrodus bimaculatus* (Bloch) Poey.

- |                 |  |                 |
|-----------------|--|-----------------|
| 18197. Bermuda. |  | 18202. Bermuda. |
| 18198. "        |  | 18203. "        |
| 18199. "        |  | 18204. "        |
| 18200. "        |  | 18205. "        |
| 18201. "        |  | 18206. "        |

80. *Holacanthus ciliaris* Lac.

- |                 |  |                 |
|-----------------|--|-----------------|
| 18243. Bermuda. |  | 21876. Bermuda. |
| 18244. "        |  | 23782. "        |

## TRICHIURIDÆ.

81. *Trichiurus lepturus* Linn.

- |                                  |  |                                      |
|----------------------------------|--|--------------------------------------|
| 19504. Beaufort, North Carolina. |  | 21541. Charleston, South Carolina.   |
| 19676. North Carolina.           |  | 22817. Pensacola, Florida.           |
| 19677. "                         |  | 23139. Southern coast United States. |

## SCOMBRIDÆ.

82. *Scomber scombrus* Linn.

- |   |  |                                     |
|---|--|-------------------------------------|
| 40604. Washington Market, from New Eng. |  | 18993. Wood's Holl, Massachusetts.  |
| 10605. " "                              |  | 18994. " "                          |
| 10650. Wood's Holl, Massachusetts.      |  | 18995. " "                          |
| 10651. " "                              |  | 18996. " "                          |
| 13593. " "                              |  | 18997. " "                          |
| 13594. " "                              |  | 18998. " "                          |
| 13595. " "                              |  | 18999. " "                          |
| 13597. " "                              |  | 19000. " "                          |
| 14429. Portland, Maine.                 |  | 21808. Gloucester, Massachusetts.   |
| 16224. Wood's Holl, Massachusetts.      |  | 23769. Provincetown, Massachusetts. |
| 16443. New York Market.                 |  | 24463. Wood's Holl, Massachusetts.  |
| 16494. Wood's Holl, Massachusetts.      |  | 24506. " "                          |
| 18989. " "                              |  | 24514. " "                          |
| 18990. " "                              |  | 24568. " "                          |
| 18991. " "                              |  | 24594. " "                          |
| 18992. " "                              |  | 25183. Gloucester, Massachusetts.   |

83. *Scomber pneumatophorus* De la Roche.

23754. Provincetown, Massachusetts.

84. *Sarda pelamys* (L.) Cuv.

8482. New York.  
14423. Noank, Connecticut.  
14424. " "  
14425. " "

14426. Noank, Connecticut.  
15435. Mouth Potomac River.  
22728. East coast United States.  
22778. " "

85. *Orcynus pelamys* (L.) Poey.

21536. Wood's Holl, Massachusetts.

21537. Wood's Holl, Massachusetts.

86. *Cybium maculatum* (Mitch.) Cuv.

23118. Washington Market.

CARANGIDÆ.

87. *Vomer setipinnis* (Mitch.) Ayres.

16838. New York Market.  
19735. East coast United States.

21655. Newport, Rhode Island.  
22753. Wood's Holl, Massachusetts.

88. *Argyreiosus vomer* (Linn.) C. & V.

19506. Beaufort, North Carolina.

89. *Decapterus punctatus* (Ag.) Gill.

18120. Bermudas.  
18121. "  
18122. "  
18123. "  
18124. "  
18125. "  
18126. "  
18127. "  
18128. "  
18129. "  
18130. "  
18131. "  
18951. Wood's Holl, Massachusetts,  
18952. " "

18953. Wood's Holl, Massachusetts.  
18954. " "  
18955. " "  
18956. " "  
18957. " "  
18958. " "  
18959. " "  
18960. " "  
18961. " "  
18962. " "  
18963. " "  
18964. " "  
19143. " "

90. *Trachurops crumenophthalmus* (Bloch) Gill.

18685. Wood's Holl, Massachusetts.  
18686. " "  
18687. " "  
18688. " "  
18689. " "  
18690. " "  
18691. " "  
18692. " "  
18693. " "  
18694. " "  
18695. " "  
18696. " "  
18697. " "  
18698. " "  
18699. " "

18700. Wood's Holl, Massachusetts.  
18701. " "  
18702. " "  
18703. " "  
18704. " "  
18725. " "  
18726. " "  
18727. " "  
18728. " "  
18729. " "  
18982. " "  
18983. " "  
21638. Newport, Rhode Island.  
22368. Wood's Holl, Massachusetts.  
22784. " "

91. *Carangus pisquetus* (C. & V.) Grt.

*Paratractus pisquetus* (C. & V.) Gill.

5991. Florida.  
13663. Wood's Holl, Massachusetts.  
14401. " "  
14402. " "  
14403. " "  
14404. " "  
14406. " "

14407. Wood's Holl, Massachusetts.  
14408. " "  
14409. " "  
14410. " "  
14412. " "  
14414. " "  
14415. " "



14416.	Wood's Holl, Massachusetts.
14417.	" "
14418.	" "
16568.	" "
17199.	" "
17200.	" "
17201.	" "
17202.	" "
17203.	" "
17204.	" "
17205.	" "
17206.	" "
17207.	" "
17208.	" "
18867.	" "
19020.	" "
19255.	" "

19296.	Wood's Holl, Massachusetts.
19298.	" "
19377.	" "
19378.	" "
19381.	" "
19383.	" "
19384.	" "
19386.	" "
19388.	" "
19391.	" "
19392.	" "
19393.	" "
19394.	" "
20628.	" "
20755.	Newport, Rhode Island.
21637.	" "
22781.	Wood's Holl, Massachusetts.

## 92. *Carangus hippos* (L.) Gill.

14389.	Wood's Holl, Massachusetts.
14390.	" "
14391.	" "
14392.	" "
14393.	" "
14394.	" "
14395.	" "
14396.	" "
14398.	" "
14400.	" "
18779.	" "
18780.	" "
18781.	" "
18782.	" "
18783.	" "
18784.	" "
18785.	" "
18786.	" "
18787.	" "
18788.	" "

18789.	Wood's Holl, Massachusetts.
18790.	" "
18791.	" "
18792.	" "
18793.	" "
18794.	" "
18795.	" "
18796.	" "
18797.	" "
18798.	" "
18799.	" "
18800.	" "
18801.	" "
18802.	" "
18803.	" "
19492.	Beaufort, North Carolina.
20842.	Newport, Rhode Island.
21654.	" "
24922.	Wood's Holl, Massachusetts.

## 93. *Blepharichthys crinitus* (Akerly) Gill.

13087.	Wood's Holl, Massachusetts.
13088.	" "
16413.	" "
16520.	" "
19984.	Mauritius.
19985.	" "
19986.	" "
19987.	" "

19988.	Mauritius.
20205.	Newport, Rhode Island.
20682.	Wood's Holl, Massachusetts.
20705.	" "
20750.	Newport, Rhode Island.
21640.	" "
22752.	Wood's Holl, Massachusetts.

## 94. *Trachynotus carolinus* (L.) Gill.

16249.	New York Market.
18808.	Wood's Holl, Massachusetts.
18809.	" "
18810.	" "
18811.	" "
18812.	" "
18813.	" "
18814.	" "
18815.	" "
18816.	" "
18817.	" "
18818.	" "
18819.	" "
18820.	" "
18821.	" "

18822.	Wood's Holl, Massachusetts.
18823.	" "
18824.	" "
18825.	" "
18826.	" "
18827.	" "
18828.	" "
18829.	" "
18830.	" "
18831.	" "
18832.	" "
22322.	" "
22737.	East coast of United States.
22768.	Wood's Holl, Massachusetts.

95. *Seriola zonata* (Mitch.) C. & V.*Halatractus zonatus* (Mitch.) Gill.

10402.	Wood's Holl, Massachusetts.	19019.	Wood's Holl, Massachusetts.
12995.	" "	19274.	" "
12998.	" "	19365.	" "
12999.	" "	19366.	" "
14384.	" "	19367.	" "
14385.	" "	19368.	" "
14387.	" "	19369.	" "
14388.	" "	19370.	" "
14953.	East coast of United States.	19371.	" "
16282.	Wood's Holl, Massachusetts.	19372.	" "
16393.	" "	19374.	" "
16543.	New Bedford, Massachusetts.	19395.	" "
16569.	Wood's Holl, Massachusetts.	20197.	Newport, Rhode Island.
18965.	" "	20646.	Wood's Holl, Massachusetts.
18966.	" "	20650.	" "
18967.	" "	20743.	Newport, Rhode Island.
18968.	" "	21636.	" "
19018.	" "	22774.	Wood's Holl, Massachusetts.

## CORYPHÆNIDÆ.

96. *Coryphæna Sueuri* C. & V.

16485. New York Market.

## STROMATEIDÆ.

97. *Palinurichthys perciformis* (Mitch.) Gill.

14055.	Wood's Holl, Massachusetts.	19288.	Wood's Holl, Massachusetts.
16080.	Off Noman's Land.	19289.	" "
16081.	" "	19290.	" "
16082.	" "	19291.	" "
16083.	" "	19292.	" "
16084.	" "	19305.	" "
16085.	" "	19750.	East coast of United States.
16086.	" "	20704.	Newport, Rhode Island.
16087.	" "	22650.	Gloucester, Massachusetts.
16088.	" "	22746.	Fishing banks off coast of Maine.
16089.	" "	22913.	East coast of United States.
16090.	" "	24252.	Gloucester, Massachusetts.
16337.	Wood's Holl, Massachusetts.	24253.	" "
16516.	New York Market.	24375.	" "
19285.	Wood's Holl, Massachusetts.	24418.	" "
19286.	" "	24431.	" "
19287.	" "	24432.	" "

98. *Poronotus triacanthus* (Peck) Gill.

10705.	Wood's Holl, Massachusetts.	14369.	Noank, Connecticut.
10706.	" "	14370.	" "
13249.	" "	14371.	Eastport, Maine.
13267.	" "	14372.	" "
13270.	" "	14373.	" "
13271.	" "	14374.	" "
13275.	" "	14375.	" "
13276.	" "	14376.	" "
13278.	" "	14377.	" "
13279.	" "	14378.	" "
14358.	" "	14379.	Portland, Maine.
14360.	" "	14381.	" "
14361.	" "	14382.	" "
14362.	" "	14383.	" "
14364.	Noank, Connecticut.	14939.	Norfolk, Virginia.
14367.	" "	14944.	Wood's Holl, Massachusetts.
14368.	" "	14951.	East coast of United States.

15082.	Tompkinsville, New York.	17196.	Noank, Connecticut,
16459.	Wood's Holl, Massachusetts.	17197.	" "
17188.	" "	17198.	" "
17189.	Noank, Connecticut.	20651.	Wood's Holl, Massachusetts.
17190.	" "	21067.	Banquereau.
17191.	" "	23155.	Wood's Holl, Massachusetts.
17192.	" "	24259.	Off coast of Maine.
17193.	" "	24260.	Vineyard Sound.
17194.	" "	24927.	Gloucester, Massachusetts.
17195.	" "		

### 99. *Peprilus alepidotus* (L.) Cuv.

*Peprilus Gardenii* (Bl. Schn.) Gill.

12871.	Off coast of Florida.	19499.	Beaufort, North Carolina.
15372.	Washington Market.	22924.	Norfolk, Virginia.
15373.	" "		

## LATILIDÆ.

### 100. *Lopholatilus chamæleonticeps* Goode & Bean.

24291. Lat. 40° 10' N., Lon. 70° 56' W., 75 fathoms.

## BERYCIDÆ.

### 101. *Holocentrum sogo* Bloch.

18071.	Bermuda.	18080.	Bermuda.
18072.	"	18081.	"
18073.	"	18082.	"
18074.	"	18083.	"
18075.	"	18084.	"
18076.	"	18085.	"
18077.	"	18086.	"
18078.	"	18087.	"
18079.	"	21891.	"

## SCIÆNIDÆ.

### 102. *Cynoscion carolinensis* (C. & V.) Gill.

8315.	Saint John's River, Florida.	19653.	Beaufort, North Carolina.
12807.	Norfolk, Virginia.	19654.	" "
19459.	" "	19713.	Fort Macon, North Carolina.
19651.	Fort Macon, North Carolina.	22932.	Off coast of North Carolina.
19652.	Beaufort, North Carolina.	24684.	Near Charleston, South Carolina.

### 103. *Cynoscion regalis* (Bloch) Gill.

12804.	Norfolk, Virginia.	18886.	Wood's Holl, Massachusetts.
14356.	Wood's Holl, Massachusetts.	18887.	" "
16323.	" "	18888.	" "
16429.	" "	18889.	" "
16548.	" "	18890.	" "
18880.	" "	18891.	" "
18881.	" "	18892.	" "
18882.	" "	18948.	" "
18883.	" "	22367.	" "
18884.	" "	23195.	" "
18885.	" "	23508.	Norfolk, Virginia.

**104. Pogonias cromis Lac.**

17904.	Saint John's River, Florida.
17905.	" "
17906.	" "
17907.	" "
17908.	" "
17909.	" "
17910.	" "
17911.	" "
17912.	" "
18303.	" "
18405.	" "
18406.	" "

18407.	Saint John's River, Florida.
18408.	" "
18409.	" "
18410.	" "
18411.	" "
18484.	" "
19040.	Florida.
19041.	" "
19764.	Southeast coast United States.
22779.	" "
24690.	Near Charleston, South Carolina.

**105. Liostomus obliquus (Mitch.) De Kay.**

16850.	New York Market.
18047.	Mouth of Saint John's River, Florida.
18333.	Saint John's River, Florida.
18334.	" "
18336.	" "
18448.	" "

18449.	Saint John's River, Florida.
18450.	" "
19055.	" "
21283.	" "
24484.	Wood's Holl, Massachusetts.
24688.	Near Charleston, South Carolina.

**106. Bairdiella argyroleuca (Mitch.) Gill.***Bairdiella punctata* (L.) Gill.

3370.	Southeast coast of United States.
17755.	Brunswick, Georgia.
18050.	Mouth of Saint John's River, Florida.
18335.	Saint John's River, Florida.
18498.	" "
18499.	" "
18500.	" "
18501.	" "
18502.	" "
18503.	" "
18504.	" "

18505.	Saint John's River, Florida.
18506.	" "
18507.	" "
18508.	" "
18509.	" "
18510.	" "
18511.	" "
18512.	" "
19062.	Florida.
22927.	" "
23169.	South Carolina.

**107. Sciænops ocellatus (Linn.) Gill.**

18317.	Saint John's River, Florida.
19498.	Beaufort, North Carolina.
19655.	" "

19714.	Fort Macon, North Carolina.
22716.	Southern coast of United States.

**108. Menticirrhus nebulosus (Mitch.) Gill.**

10701.	Wood's Holl, Massachusetts.
10709.	" "
14353.	Noank, Connecticut.
14354.	Wood's Holl, Massachusetts.
15579.	New York Market.
18712.	Wood's Holl, Massachusetts.
18713.	" "
18847.	" "
18848.	" "
18849.	" "
18850.	" "

18851.	Wood's Holl, Massachusetts.
18852.	" "
18853.	" "
18854.	" "
18855.	" "
18856.	" "
18857.	" "
18858.	" "
18859.	" "
21441.	Cohasset Narrows, Massachusetts.
22757.	East coast of United States.

**109. Menticirrhus littoralis (Holbr.) Gill.**

19081.	Florida.
19082.	" "
19083.	" "
19084.	" "
19085.	" "
19086.	" "

19087.	Florida.
19088.	" "
19089.	" "
19090.	" "
19091.	" "

**110. *Micropogon undulatus* (L.) C. & V.**

18332.	Saint John's River, Florida.	18495.	Saint John's River, Florida.
18493.	" "	22740.	East coast of United States.
18494.	" "	22933.	" "

**85. *Orcynus pelamys* (L.) Poey.**

21364.	Bermuda.	21881.	Bermuda.
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**112. *Haploidonotus grunniens* Raf.**

9504.	Mississippi Valley.	17770.	Sandusky, Ohio.
11037.	Sandusky, Ohio.	17771.	" "
11040.	" "	17772.	" "
11041.	" "	17773.	" "
11089.	Ausable River, Michigan.	17774.	" "
12279.	Cincinnati, Ohio.	17775.	" "
12285.	" "	17776.	" "
12286.	" "	17777.	" "
12287.	" "	17778.	" "
12288.	" "	17779.	" "
17768.	Detroit, Michigan.	17780.	" "
17769.	Sandusky, Ohio.	17781.	" "

**GERRIDÆ.****113. *Diapterus gula*.**

21896.	Bermuda.	23580.	Bermuda.
23557.	"	23581.	"
23562.	"	23582.	"
23564.	"	23583.	"
23567.	"	23584.	"
23568.	"	23586.	"
23569.	"	23587.	"
23570.	"	23588.	"
23571.	"	23590.	"
23576.	"	23591.	"
23579.	"	23592.	"

**114. *Diapterus Lefroyi* Goode.***Eucinostomus Lefroyi* Goode.

18157.	Bermuda.	18165.	Bermuda.
18158.	"	18166.	"
18159.	"	18167.	"
18160.	"	18168.	"
18161.	"	18169.	"
18162.	"	18170.	"
18163.	"	18171.	"
18164.	"	18172.	"

**PIMELEPTERIDÆ.****115. *Pimelepterus Boscii* Lac.**

10338.	Bermuda.	18187.	Bermuda.
18173.	"	18188.	"
18174.	"	18189.	"
18175.	"	18190.	"
18176.	"	18191.	"
18177.	"	18192.	"
18178.	"	18193.	"
18179.	"	18194.	"
18180.	"	18195.	"
18181.	"	18196.	"
18182.	"	20177.	"
18183.	"	21900.	"
18184.	"	23547.	"
18185.	"	23548.	"
18186.	"		



## SPARIDÆ.

**116. *Lagodon rhomboides* (L.) Holbrook.**

17899.	Saint John's River, Florida.	18457.	Saint John's River, Florida.
17900.	" "	18458.	" "
17901.	" "	18459.	" "
18343.	" "	18460.	" "
18344.	" "	18461.	" "
18345.	" "	18462.	" "
18346.	" "	19134.	Florida.
18451.	" "	19687.	Fort Macoe, North Carolina.
18452.	" "	19716.	" "
18453.	" "	21280.	Saint John's River, Florida.
18454.	" "	21569.	Charleston, South Carolina.
18455.	" "	21570.	" "
18456.	" "	24284.	East coast of United States.

**117. *Archosargus probatocephalus* (Walb.) Gill.**

15578.	New York Market.	18399.	Saint John's River, Florida.
18309.	Saint John's River, Florida.	18400.	" "
18389.	" "	18401.	" "
18390.	" "	18402.	" "
18391.	" "	18403.	" "
18392.	" "	18404.	" "
18393.	" "	18413.	" "
18394.	" "	18414.	" "
18395.	" "	18415.	" "
18396.	" "	18416.	" "
18397.	" "	21546.	Charleston, South Carolina.
18398.	" "	22729.	East coast of United States.

**118. *Stenotomus argyrops* (L.) Gill.**

5940.	East coast of United States.	14345.	Wood's Holl, Massachusetts.
10652.	Wood's Holl, Massachusetts.	14347.	" "
10668.	" "	14348.	" "
10702.	" "	14349.	" "
12922.	" "	14350.	" "
12923.	" "	14351.	" "
14326.	" "	14352.	" "
14327.	" "	14964.	" "
14328.	" "	14965.	" "
14329.	" "	16007.	" "
14330.	" "	16030.	" "
14331.	" "	16042.	" "
14332.	" "	16049.	" "
14333.	" "	17186.	" "
14335.	" "	17187.	" "
14336.	" "	21436.	Cohasset Narrows, Massachusetts.
14337.	" "	22758.	Wood's Holl, Massachusetts.
14338.	" "	22925.	East coast of United States.
14339.	" "	24468.	Wood's Holl, Massachusetts.
14340.	" "	24491.	" "
14341.	" "	24508.	" "
14342.	" "	24512.	" "
14344.	" "	24545.	" "

**119. *Sargus Holbrookii* Bean.**

20979.	Charleston, South Carolina.	24691.	Charleston, South Carolina.
22870.	New York Market.		

**120. *Calamus megacephalus* (Sw.) Poey.**

21893.	Bermuda.
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**121. *Pagrus argenteus* Schn.?**

24695.	Off Charleston, South Carolina.
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## PRISTIPOMATIDÆ.

**122. *Pristipoma fulvomaculatum* (Mitch.) Gthr.**

22923. East coast of United States.

| 23507. Norfolk, Virginia.

**123. *Hæmylum xanthopterum* C. & V.**

18219. Bermuda.

18220. "

18221. "

18222. "

18223. "

18224. "

18225. "

18226. "

18227. "

18228. "

18229. "

18230. "

18231. "

18232. Bermuda.

18233. "

18234. "

18235. "

18236. "

18237. "

18238. "

18239. "

18240. "

18241. "

18242. "

20179. "

21372. "

**124. *Hæmylum flaviguttatus* Gill.**

19632. Colima.

**125. *Hæmylum*.**

19639. Florida.

**126. *Lutjanus caxis* (Schn.) Poey.**

18101. Bermuda.

18102. "

18103. "

18104. "

18105. "

18106. "

18107. "

18108. "

18109. "

18110. Bermuda.

18111. "

18112. "

18113. "

18114. "

18115. "

18116. "

18117. "

22798. "

**127. *Lutjanus Blackfordii* Goode & Bean.**

22795. Southern coast of United States.

**128. *Rhomboplites aurorubens* (C. & V.) Gill.**

21224. Charleston, South Carolina.

| 21571. Charleston, South Carolina.

## CENTRARCHIDÆ.

**129. *Micropterus salmoides* (Lac.) Gill.**

10715. Potomac River.

11100. Bay City, Michigan.

11208. Alpena, Michigan.

12308. Charlestown, New Hampshire.

12309. " "

12310. " "

12809. Norfolk, Virginia.

15517. Potomac River.

16844. New York Market.

17791. Holyoke, Massachusetts.

19614. Sandusky, Ohio.

19615. " "

19616. " "

19617. Bay City, Michigan.

22727. Potomac River.

**130. *Micropterus pallidus* (Raf.) Gill & Jordan.**

10380. Norfolk, Virginia.

10381. " "

11072. Sandusky, Ohio.

12297. Cincinnati, Ohio.

12298. " "

12472. Sandusky, Ohio.

15664. New York Market.

16910. Tangipahoa River, Mississippi.

16911. " "

16912. " "

16913. " "

16914. " "

17925.	Saint John's River, Florida.
17968.	Wilmington, North Carolina.
18438.	Saint John's River, Florida.
18439.	" "
18440.	" "
19032.	" "
19033.	" "
19034.	" "

19035.	Saint John's River, Florida.
19036.	" "
19037.	" "
19038.	" "
19039.	" "
20555.	Jacksonville, Florida.
21278.	Saint John's River, Florida.
24812.	North Carolina.

**131. Ambloplites rupestris (Raf.) Gill.**

4173.	Rochester, Wisconsin.
5707.	Lake Champlain.
7667.	" "
7673.	Yellow Creek, Ohio.
7686.	Racine, Wisconsin.
7705.	Cleveland, Ohio.
7708.	" "
7734.	Yellow Creek, Ohio.
8469.	Red River, British America.
8926.	Sandusky, Ohio.

11013.	Sandusky, Ohio.
11014.	" "
11016.	" "
11218.	Alpena, Michigan.
12415.	Sandusky, Ohio.
16919.	Tangipahoa River, Mississippi.
19622.	Sandusky, Ohio.
23183.	" "
24666.	Aux Plaines, Illinois.

**132. Acantharcus pomotis (Bd.) Gill.**

17844.	New Jersey.
20353.	Trenton, New Jersey.

24654.	Watson's Creek, New Jersey.
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**133. Chænobryttus gulosus (C. & V.) Gill.**

*Chænobryttus viridis* (C. & V.) Jordan.

18384.	Saint John's River, Florida.
18385.	" "
18387.	" "
18514.	" "
18515.	" "
18516.	" "
18517.	" "
18519.	" "
18520.	" "
18521.	" "
19096.	" "
19097.	" "
19098.	" "

19099.	Saint John's River, Florida.
19100.	" "
24753.	Washington Market (from N. C.).
24754.	" "
24755.	" "
24756.	" "
24757.	" "
24758.	" "
24759.	" "
24760.	" "
24761.	" "
24769.	" "
24809.	" "

**134. Apomotis cyanellus (Raf.) Jordan.**

20052.	Cumberland River, Tennessee.
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**135. Lepomis auritus (L.) Gill.**

4220.	Florida.
6246.	Sing Sing, New York.
7757.	" "
7775.	" "
8099.	Rivers of east coast of United States.

15351.	Susquehanna River, Pennsylvania.
18017.	" "
20305.	Havre de Grace, Maryland.
21453.	Potomac River.
22230.	" "

**136. Lepomis pallidus (Mitch.) Gill & Jordan.**

11066.	Sandusky, Ohio.
11069.	" "
11070.	" "
11217.	" "
12469.	" "
19109.	Saint John's River, Florida.
19113.	" "
19114.	" "
19116.	" "
19118.	" "
19119.	" "

19123.	Saint John's River, Florida.
19125.	" "
19126.	" "
19127.	" "
19128.	" "
19129.	" "
19131.	" "
19132.	" "
19133.	" "
24762.	North Carolina.
24763.	" "

**137. *Lepomis punctatus*.**

17948. Saint John's River, Florida.  
 18361. " "  
 18363. " "  
 18365. " "  
 18366. " "  
 18375. " "

18377. Saint John's River, Florida.  
 18464. " "  
 18473. " "  
 18477. " "  
 18480. " "  
 23170. Florida.

**138. *Xenotis sanguinolentus* (Ag.) Jordan.**

16922. Tangipahoa River, Mississippi.

**139. *Xenotis peltastes* (Cope) Jordan.**

3274. Racine, Wisconsin.

| 9266. Michigan,

**140. *Xystroplites heros* (B. & G.) Jordan.**

4158. Saint Louis, Missouri.

**141. *Eupomotis aureus* (Walb.) Gill & Jordan.**

11063. Sandusky, Ohio.  
 11064. " "  
 11065. " "  
 12952. South Hadley Falls, Massachusetts.  
 14941. Washington Market.  
 14942. "  
 14962. "  
 18260. "  
 18261. "  
 18262. "  
 18263. "  
 18264. "  
 18265. "  
 18266. "  
 18267. "  
 18268. "

18269. Washington Market.  
 18270. "  
 18271. "  
 18272. "  
 18273. "  
 18274. "  
 18275. "  
 18276. "  
 18277. "  
 19631. "  
 20304. Havre de Grace, Maryland.  
 22863. Potomac River, Washington, D. C.  
 24668. Aux Plaines, Illinois.  
 24768. Washington Market, from North Carolina.  
 24810. " "  
 24877. " "

**142. *Eupomotis speciosus* (Holbr.) Gill.**

18364. Saint John's River, Florida.  
 18369. " "  
 18371. " "  
 18373. " "  
 18383. " "  
 18469. " "  
 18478. " "  
 19103. " "

19106. Saint John's River, Florida.  
 19107. " "  
 19108. " "  
 19110. " "  
 19115. " "  
 19117. " "  
 19120. " "

**143. *Enneacanthus margarotis* Gill & Jordan.**

20494. Watson's Creek, Mercer County, New Jersey.

**144. *Enneacanthus obesus* (Baird) Gill.**

24659. San Francisco Market, California.

**145. *Centrarchus irideus* (Bosc.) C. & V.**

7747. Tarborough, North Carolina.  
 24601. Washington Market, from N. Carolina.  
 24662. North Carolina.  
 24676. "  
 24677. "  
 24748. Washington Market, from N. Carolina.

24749. Washington Market, from North Carolina.  
 24750. " "  
 24751. " "  
 24752. " "  
 24766. " "  
 24808. " "

**146. *Pomoxys nigromaculatus* (LeS.) Girard.**

10382.	Norfolk, Virginia.	18524.	Kinston, North Carolina.
10386.	" "	18525.	" "
11007.	Sandusky, Ohio.	18526.	" "
11011.	" "	19312.	Licking River, Ohio.
11160.	" "	19313.	" "
12805.	Norfolk, Virginia.	19314.	" "
17903.	Saint John's River, Florida.	19315.	" "
17964.	Wilmington, North Carolina.	19317.	" "
17965.	" "	19318.	" "
17967.	" "	19319.	" "
17969.	" "	19320.	" "
17970.	" "	23181.	Sandusky, Ohio.
18350.	Saint John's River, Florida.	24767.	Washington Market.
18351.	" "	24891.	" "

**147. *Pomoxys annularis* Raf.**

23182. Mississippi Valley.

## SERRANIDÆ.

**148. *Epinephelus striatus* (Bloch) Gill.**

18088.	Bermuda.	18095.	Bermuda.
18089.	"	18096.	"
18090.	"	18097.	"
18091.	"	18098.	"
18092.	"	18099.	"
18093.	"	18100.	"
18094.	"		

**149. *Epinephelus guttatus* (Gmelin) Goode.**

12709.	Bermuda.	19644.	Florida.
18113.	"	20182.	Bermuda.
18119.	"	21883.	"

**150. *Epinephelus morio* (Cuv.) Gill.**

22775. Bermuda.

**151. *Centropristis atrarius* (Linn.) Barn.**

10642.	Wood's Holl, Massachusetts.	17181.	Noank, Connecticut.
10667.	" "	17182.	" "
14321.	Noank, Connecticut.	17183.	" "
14322.	" "	17184.	" "
14323.	" "	17241.	Wood's Holl, Massachusetts.
14324.	Wood's Holl, Massachusetts.	19300.	" "
14325.	" "	19417.	" "
16026.	" "	19511.	Beaufort, North Carolina.
16574.	" "	19641.	Florida.
17174.	Noank, Connecticut.	19828.	Wood's Holl, Massachusetts.
17175.	" "	21440.	Cohasset Narrows, Massachusetts.
17176.	" "	22378.	Wood's Holl, Massachusetts.
17177.	" "	22800.	" "
17178.	" "	22959.	East coast of United States.
17179.	" "	24584.	Wood's Holl, Massachusetts.
17180.	" "		

**152. *Diplectrum fasciculare* (C. & V.) Holbrook.**

24692. Off Charleston, South Carolina.



## ETHEOSTOMATIDÆ.

**153. *Percina caprodes* (Raf.) Girard.**

1152.	Meadville, Pennsylvania.	1317.	Poland, Ohio.
1201.	Racine, Wisconsin.	1369.	Yellow Creek, Ohio.
1202.	" "	1394.	Madrid, New York.
1223.	Wisconsin.	8145.	Ohio.
1246.	Columbus, Ohio.	9662.	"
1264.	Westport, New York.	9731.	Potomac River.
1306.	Poland, Ohio.	20407.	Pennsylvania.

**154. *Diplesium blennioides* (Raf.) Jordan.**

1307.	Black River, Ohio.
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## PERCIDÆ.

**155. *Perca fluviatilis*.***Perca americana* Schrank.

7118.	Sandusky, Ohio.	14976.	Washington Market.
7259.	" "	15333.	"
7281.	Ohio.	15334.	"
7344.	Sandusky, Ohio.	15335.	"
7345.	" "	15336.	"
7430.	" "	15337.	"
7441.	Ohio.	15338.	"
7478.	"	15339.	"
7878.	"	15340.	"
8094.	"	15341.	"
8713.	Ecorse, Michigan.	15342.	"
8831.	" "	15343.	"
8832.	" "	15344.	"
8883.	Sandusky, Ohio.	15345.	"
10227.	" "	15346.	"
10330.	Deep Lake, Illinois.	15347.	"
11001.	Sandusky, Ohio.	15348.	"
11003.	" "	15402.	Chapman's Landing, Maryland.
11004.	" "	18527.	Kinston, North Carolina.
11005.	" "	18528.	" "
11149.	" "	19450.	Potomac River.
11150.	" "	19491.	"
11176.	Van Hutton Lake, Michigan.	19779.	"
12321.	Washington Market.	19781.	Sandusky, Ohio.
12324.	"	19782.	" "
12325.	"	19783.	" "
12947.	South Hadley Falls, Massachusetts.	20550.	Illinois.

**156. *Stizostethium vitreum* (Mitch.) Jordan & Copeland.***Stizostethium americanum* (Cuv.) Gld.

10811.	Sandusky, Ohio.	19769.	Ecorse, Michigan.
11181.	Ausable, Michigan.	19776.	" "
11182.	" "	22704.	East coast of United States
11183.	" "	22705.	" "
11184.	" "	22706.	" "
11186.	" "	22707.	" "
12391.	Ecorse, Michigan.	22715.	" "
12392.	" "	22741.	" "
12396.	" "		

**157. *Stizostethium canadense* (Smith) Jordan.**

22238.	Memphis, Tennessee.
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LABRACIDÆ.

158. *Morone americana* (Gmel.) Gill.

1750.	Sing Sing, New York.
10633.	Potomac River.
10634.	"
10690.	"
10729.	Wood's Holl, Massachusetts.
10730.	" "
13354.	" "
14319.	" "
15323.	Washington Market.
15324.	"
15325.	"
15326.	"
15327.	"
15328.	"
15329.	"
15330.	"
15331.	"
15332.	"

15471.	Chapman's Landing, Maryland.
15472.	" "
17127.	Noank, Connecticut.
17128.	" "
17129.	" "
17130.	" "
17242.	Potomac River.
17243.	"
17244.	"
17245.	"
17246.	"
17247.	"
17248.	"
17249.	"
17250.	"
22308.	New York Market.
24925.	Wood's Holl, Massachusetts.

159. *Roccus lineatus* (Bl. Schn.) Gill.

10693.	Wood's Holl, Massachusetts.
12808.	Norfolk, Virginia.
19321.	Washington Market.
19322.	"
19323.	"
19324.	"
19325.	"
19326.	"
19327.	"
19328.	"
19329.	"
19330.	"
19331.	"
19332.	"
19333.	"

19334.	Washington Market.
19335.	"
19336.	"
19337.	"
19338.	"
19339.	"
19447.	Potomac River.
19613.	Holyoke, Massachusetts.
22714.	East coast of United States.
22726.	" "
22960.	" "
23117.	Washington Market.
24807.	North Carolina.
24846.	Washington Market.

160. *Roccus chrysops* (Raf.) Gill.

9142.	Sandusky, Ohio.
11006.	" "
11051.	" "

12468.	Sandusky, Ohio.
19620.	" "

161. *Paralabrax clathrata* Girard.

17037.	Santa Cruz Island, California.
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17038.	Santa Barbara, California.
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EPHIPPIIDÆ.

162. *Parephippus quadratus* (Gün.) Gill.

19493.	Beaufort, North Carolina.
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POMATOMIDÆ.

163. *Pomatomus saltatrix* (Linn.) Gill.

10768.	Wood's Holl, Massachusetts.
14097.	Noank, Connecticut.
14312.	" "
14313.	" "
14314.	" "
14315.	" "
14316.	Wood's Holl, Massachusetts.
14318.	" "
15554.	New York Market.
16124.	Wood's Holl, Massachusetts.
16125.	" "
16139.	Menemsha Bight, Massachusetts.
16371.	Wood's Holl, Massachusetts.
17585.	Noank, Connecticut.
17586.	" "

17587.	Noank, Connecticut.
17588.	" "
17589.	" "
17590.	" "
17591.	" "
17592.	" "
17593.	" "
17594.	" "
17595.	" "
18491.	Saint John's River, Florida.
18492.	" "
19054.	" "
19301.	Wood's Holl, Massachusetts.
22719.	East coast of United States.
22762.	Wood's Holl, Massachusetts.

## AMMODYTIDÆ.

164. *Ammodytes americanus* De Kay.

13095.	Wood's Holl, Massachusetts.	19330.	Wood's Holl, Massachusetts.
16193.	" "	19842.	" "
16559.	Nantucket, Rhode Island.	22841.	" "

## ECHENEIDIDÆ.

165. *Echeneis naucrateoides* (Zuciew).

20702.	Newport, Rhode Island.	22917.	East coast of United States.
20843.	" "	22918.	" "
22776.	East coast of United States.		

## SPHYRÆNIDÆ.

166. *Sphyræna borealis* De Kay.

18754.	Wood's Holl, Massachusetts.	18767.	Wood's Holl, Massachusetts.
18755.	" "	18768.	" "
18756.	" "	18769.	" "
18757.	" "	18770.	" "
18758.	" "	18771.	" "
18759.	" "	18772.	" "
18760.	" "	18773.	" "
18761.	" "	18774.	" "
18762.	" "	18775.	" "
18763.	" "	18776.	" "
18764.	" "	18777.	" "
18765.	" "	18778.	" "
18766.	" "		

## MUGILIDÆ.

167. *Mugil albula* Linn.*Mugil lineatus* Mitch.

14930.	North Carolina.	15322.	Washington Market.
15307.	Washington Market.	18568.	Wood's Holl, Massachusetts.
15308.	" "	18569.	" "
15309.	" "	18570.	" "
15310.	" "	18571.	" "
15311.	" "	18572.	" "
15312.	" "	18804.	" "
15313.	" "	18805.	" "
15315.	" "	18806.	" "
15316.	" "	18807.	" "
15317.	" "	21635.	Newport, Rhode Island.
15318.	" "	22387.	Wood's Holl, Massachusetts.
15319.	" "	22777.	" "
15320.	" "	24510.	" "
15321.	" "	24697.	Near Charleston, South Carolina.

168. *Mugil brasiliensis* Ag.

24505. Wood's Holl, Massachusetts.

169. *Mugil cephalotus* Cuv. & Val.

18003. Honolulu, Hawaii.

ATHERINIDÆ.

170. *Chirostoma menidium* (L.) Gill.

*Chirostoma notata* (Mitch.) Gill.

1318.	Wood's Holl, Massachusetts.	17645.	Wood's Holl, Massachusetts.
17630.	" "	17646.	" "
17631.	" "	17647.	" "
17632.	" "	17648.	" "
17633.	" "	17649.	" "
17634.	" "	17650.	" "
17635.	" "	17651.	" "
17636.	" "	17652.	" "
17638.	" "	17653.	" "
17639.	" "	17654.	" "
17640.	" "	17655.	" "
17641.	" "	22858.	Orland, Maine.
17642.	" "	23157.	Wood's Holl, Massachusetts.
17643.	" "	24541.	" "
17644.	" "	24923.	" "

BELONIDÆ.

171. *Belone longirostris* (Mitch.) Gill.

14018.	Noank, Connecticut.	18836.	Wood's Holl, Massachusetts.
17574.	" "	18837.	" "
17575.	" "	18838.	" "
17576.	" "	18839.	" "
17577.	" "	18840.	" "
17578.	" "	18841.	" "
17579.	" "	18842.	" "
17580.	" "	18843.	" "
17581.	" "	18844.	" "
17582.	" "	18845.	" "
17583.	" "	18846.	" "
17584.	" "	20629.	" "
18833.	Wood's Holl, Massachusetts.	21451.	" "
18834.	" "	22371.	" "
18835.	" "	22773.	" "

172. *Belone hians*.

21424. New York Market.

173. *Belone latimanus* Poey.

18721.	Wood's Holl, Massachusetts.	21421.	New York Market.
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SCOMBRESOCIDÆ.

174. *Hemirhamphus Pleii* Val.

18132.	Bermuda.	18138.	Bermuda.
18133.	" "	18139.	" "
18134.	" "	18140.	" "
18135.	" "	18141.	" "
18136.	" "	18142.	" "
18137.	" "	18143.	" "

175. *Scomberesox saurus* (Walb.) Flem.

*Scomberesox scutellatus* LeS.

19196.	Wood's Holl, Massachusetts.	19206.	Cape Cod, Massachusetts.
19197.	" "	19207.	" "
19203.	Cape Cod, Massachusetts.	19208.	" "
19204.	" "	19845.	Wood's Holl, Massachusetts.
19205.	" "		

## ESOCIDÆ.

176. *Esox lucius* Linn.

11025.	Sandusky, Ohio.	12942.	South Hadley Falls, Massachusetts.
11027.	" "	15659.	New York Market.
11143.	" "	17784.	Sandusky, Ohio.

177. *Esox nobilior* Thompson.

11028.	Sandusky, Ohio.	11029.	Sandusky, Ohio.
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178. *Esox americanus* Gmelin.

1587.	Piermont, New York.	15716.	New York Market.
6814.	New York.	20359.	Trenton, New Jersey.
15711.	New York Market.	24771.	Long Island, New York.

179. *Esox reticulatus* LeS.

10388.	Norfolk, Virginia.	17786.	Norfolk, Virginia.
12453.	" "	24848.	Washington Market.
12943.	South Hadley Falls, Massachusetts.	24892.	" "
15012.	Washington Market.	24896.	" "
17785.	Norfolk, Virginia.		

## UMBRIDÆ.

180. *Umbra limi* (Kirt.) Günth.*Melanura limi* (Kirt.) Ag.

8807.	Northfield, Illinois.	9288.	Racine, Wisconsin.
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181. *Dallia pectoralis* Bean.

6661. Saint Michael's, Alaska.

## CYPRINODONTIDÆ.

182. *Cyprinodon variegatus* Lac.

17706.	Noank, Connecticut.	17719.	Noank, Connecticut.
17707.	" "	17720.	" "
17708.	" "	17721.	" "
17709.	" "	17722.	" "
17710.	" "	17724.	" "
17711.	" "	17725.	" "
17712.	" "	17726.	" "
17713.	" "	17727.	" "
17714.	" "	17728.	" "
17715.	" "	17729.	" "
17716.	" "	17730.	" "
17717.	" "	24581.	Wood's Holl, Massachusetts.
17718.	" "		

183. *Fundulus pisculentus* (Mitch.) Val.

13762.	Wood's Holl, Massachusetts.	17693.	Wood's Holl, Massachusetts.
13901.	Casco Bay, Maine.	17694.	" "
13903.	" "	17695.	" "
17681.	Wood's Holl, Massachusetts.	17696.	" "
17682.	" "	17697.	" "
17683.	" "	17698.	" "
17684.	" "	17699.	" "
17685.	" "	17700.	" "
17686.	" "	17701.	" "
17687.	" "	17702.	" "
17688.	" "	17703.	" "
17689.	" "	17704.	" "
17690.	" "	17705.	" "
17691.	" "	20888.	" "
17692.	" "		



**184. *Fundulus parvipinnis*.**

24883. San Diego, California.

**185. *Hydrargyra majalis* (Walb.) Val.**

17656.	Wood's Holl, Massachusetts.	17669.	Wood's Holl, Massachusetts.
17657.	" "	17670.	" "
17658.	" "	17671.	" "
17659.	" "	17672.	" "
17660.	" "	17673.	" "
17661.	" "	17674.	" "
17662.	" "	17675.	" "
17663.	" "	17676.	" "
17664.	" "	17677.	" "
17665.	" "	17678.	" "
17666.	" "	17679.	" "
17667.	" "	17680.	" "
17668.	" "		

**PERCOPSIDÆ.**

**186. *Percopsis guttatus* Ag.**

6901.	Lake Superior.	24772.	Lake Superior.
8746.	" "		

**SYNODONTIDÆ.**

**187. *Synodus fœtens* (Linn.) Gill.**

19507. Beaufort, North Carolina.

**MICROSTOMIDÆ.**

**188. *Mallotus villosus* (Müller) Cuv.**

12698.	Halifax, Nova Scotia.	24924.	Wood's Holl, Massachusetts.
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**189. *Osmerus mordax* (Mitch.) Gill.**

13330.	Wood's Holl, Massachusetts.	18976.	Wood's Holl, Massachusetts.
13339.	" "	18977.	" "
13866.	" "	18978.	" "
13936.	Noank, Connecticut.	18979.	" "
16113.	Wood's Holl, Massachusetts.	18980.	" "
16186.	Noank, Connecticut.	19838.	" "
18971.	Wood's Holl, Massachusetts.	20959.	Bucksport, Maine.
18972.	" "	20964.	" "
18973.	" "	23173.	Wood's Holl, Massachusetts.
18974.	" "	24441.	" "
18975.	" "	24476.	" "

**190. *Osmerus pacificus*.**

23184.	Naas River, Oregon.	23185.	Fraser River, British Columbia.
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**COREGONIDÆ.**

**191. *Thymallus tricolor* Cope.**

11080.	Ausable River, Michigan.	11094.	Ausable River, Michigan.
11083.	" "	11095.	" "
11084.	" "	11096.	" "
11088.	" "	11097.	" "
11091.	" "	11098.	" "
11092.	" "	19547.	" "
11093.	" "	19548.	" "

**192. *Argyrosomus Artedi* (LeS.) Hoy.**

*A. clupeiiformis* (Mitch.) Ag.

6813.	Great Lakes.	11162.	Sandusky, Ohio.
10801.	Sandusky, Ohio.	11195.	Ausable River, Michigan.

**193. *Argyrosomus Artedi* (LeS.) Hoy var. *sisco* Jor.**

21501. Geneva Lake, Wisconsin.

**SALMONIDÆ.****194. *Salmo salar* Linn. var. *sebago* Girard.**

10543. Grand Lake, Maine.

12370. Sebes Pond, Maine.

20764. Schoodic Lake, Maine.

**195. *Salmo irideus* Gibbons.**

22336. McCloud River, California.

22338. " "

22353. " "

22354. " "

22356. " "

22359. " "

22361. " "

22402. California.

22404. " "

22405. " "

22406. " "

22419. McCloud River, California.

22420. " "

22421. " "

22422. " "

22423. " "

22424. " "

22425. " "

22426. " "

22427. " "

22428. " "

22429. " "

22430. McCloud River, California.

22431. " "

22432. " "

22454. " "

22455. " "

22456. " "

22457. " "

22458. " "

22459. " "

22460. " "

22462. " "

22463. " "

22464. " "

22465. " "

22470. " "

22471. " "

22473. Clackamas River, Oregon.

22474. McCloud River, California.

22475. " "

22476. " "

22484. Clackamas River, Oregon.

22485. " "

**196. *Oncorhynchus quinnat* (Rich.) Gthr.**

22335. McCloud River, California.

22340. " "

22345. " "

22393. " "

22394. " "

22395. " "

22396. " "

22410. " "

22411. " "

22412. " "

22413. " "

22414. " "

22415. " "

22416. " "

22417. " "

22418. " "

22433. " "

22434. McCloud River, California.

22435. " "

22436. " "

22437. " "

22438. " "

22440. " "

22441. " "

22444. " "

22445. " "

22447. " "

22448. " "

22449. " "

22481. " "

22482. " "

22483. " "

23153. California.

**197. *Salvelinus fontinalis* (Mitch.) Gill & Jor.**

3613. Madrid, New York.

6820. Sing Sing, New York.

7064. " "

7988. Madrid, New York,

16098. Luzerne County, Pennsylvania.

16099. " "

21581. New York Market.

**198. *Salvelinus oquassa* (Girard) Gill & Jor.**

19521. New York Market.

199. *Salvelinus Bairdii* (Suckley) Gill & Jor.

15533.	McCloud River, California.	22357.	Clackamas River, Oregon.
22337.	" "	22469.	McCloud River, California.
22355.	Clackamas River, Oregon.		

ALEPIDOSAURIDÆ.

200. *Alepidosaurus ferox* Lowe.

22294.	Off Gloucester, Massachusetts.	24244.	Western part Le Have Bank, 120 fathoms.
22640.	" "	24296.	Lat. 42° 37' N., Lon. 62° 55' W., 200 fathoms.
22641.	Le Have Bank, 200-250 fathoms.	24297.	" " "
24243.	Lat. 43° 06' N., Lon. 61° 18' W., 200 fms.		

HYODONTIDÆ.

201. *Hyodon tergisus* LeS.

11058.	Sandusky, Ohio.	12450.	Ecorse, Michigan.
11170.	" "	12451.	" "
11221.	Cincinnati, Ohio.	12474.	Yellowstone River.
12255.	" "	12475.	" "
12256.	" "	12476.	" "
12257.	" "	12478.	Pompey's Pillar.
12258.	" "	12480.	Yellowstone River.
12259.	" "	18564.	Sandusky, Ohio.
12261.	" "	18566.	Ecorse, Michigan.
12262.	" "	18567.	" "
12263.	" "	22961.	" "

ALBULIDÆ.

202. *Albula vulpes*.

*Albula conorhynchus* Bl. Schn.

18144.	Bermuda.	18153.	Bermuda.
18145.	" "	18154.	" "
18146.	" "	18155.	" "
18147.	" "	18156.	" "
18148.	" "	19788.	" "
18149.	" "	21560.	New York Market.
18150.	" "	21648.	Newport, Rhode Island.
18151.	" "	21859.	New Bedford, Massachusetts.
18152.	" "	21863.	New London, Connecticut.

ELOPIDÆ.

203. *Elops saurus* Linn.

15573.	New York Market.	19637.	Florida.
15574.	" "	19649.	Fort Macon, North Carolina.
15580.	" "	19851.	Wood's Holl, Massachusetts.
16852.	New Bedford, Massachusetts.	19874.	" "
18573.	Wood's Holl, Massachusetts.	21559.	New York Market.
18574.	" "	22955.	" "
18575.	" "	24802.	" "
18576.	" "	24803.	" "

DUSSUMIERIDÆ.

204. *Etrumeus teres* (DeKay) Brevoort.

19517.	Wood's Holl, Massachusetts.
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## CLUPEIDÆ.

205. *Brevoortia tyrannus* (Latrobe) Goode.*Brevoortia menhaden* (Mitch.) Gill.

10698.	Wood's Holl, Massachusetts.	18420.	Saint John's River, Florida.
14302.	" "	18421.	" "
14303.	" "	18422.	" "
14304.	" "	18423.	" "
14305.	" "	18424.	" "
14306.	Noank, Connecticut.	18425.	" "
14307.	" "	18426.	" "
14308.	" "	18427.	" "
14309.	" "	18428.	" "
14948.	" "	18429.	" "
16012.	Wood's Holl, Massachusetts.	18431.	" "
16014.	" "	19043.	" "
16016.	" "	19045.	" "
18417.	Saint John's River, Florida.	22801.	Wood's Holl, Massachusetts.
18418.	" "	24434.	Yorktown, Virginia.
18419.	" "	24465.	Wood's Holl, Massachusetts.

206. *Brevoortia patronus* Goode.

21341.	Pensacola, Florida.	22810.	Pensacola, Florida.
22809.	" "	22825.	" "

207. *Alosa sapidissima* (Wils.) Linsly.

5472.	New Bedford, Massachusetts.	14500.	Portland, Maine.
10626.	Potomac River.	14301.	" "
10627.	" "	14847.	Noank, Connecticut.
10629.	" "	14931.	Neuse River, North Carolina.
12944.	South Hadley Falls, Massachusetts.	14934.	Washington Market.
12945.	" "	18513.	" "
12946.	" "	19209.	" "
14292.	Noank, Connecticut.	20469.	South Hadley Falls, Massachusetts.
14293.	" "	20472.	" "
14294.	" "	20970.	Avoca, North Carolina.
14295.	Portland, Maine.	21225.	Gravesend Bay, New York.
14296.	" "	21414.	Avoca, North Carolina.
14297.	" "	22953.	East coast of United States.
14298.	" "	23107.	Avoca, North Carolina.
14299.	" "		

208. *Opisthonema thrissa* Gill.

19463. Eastern shore of Virginia.

209. *Pomolobus æstivalis* (Mitch.) Goode & Bean.*P. pseudoharengus* (Wils.) Gill (in part).

22370.	Wood's Holl, Massachusetts.	23175.	Wood's Holl, Massachusetts.
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210. *Pomolobus vernalis* (Mitch.) Goode & Bean.*P. pseudoharengus* (Wils.) Gill (in part).

14848.	Noank, Connecticut.	23176.	Wood's Holl, Massachusetts.
21439.	Cohasset Narrows, Massachusetts.	23177.	" "
22369.	Wood's Holl, Massachusetts.	23178.	" "
22786.	" "		

211. *Pomolobus pseudoharengus* (Wilson) Gill.

Under this name, which is now known to have been bestowed upon the two distinct species immediately preceding it in this list, a number of specimens were distributed in 1877. *Pomolobus vernalis* may be at

once separated from *P. astivalis* by its larger eye and higher fins. The catalogue numbers of the mixed lot follow.

10644.	Wood's Holl, Massachusetts,	14279.	Portland, Maine.
10645.	" "	14280.	" "
10659.	" "	14281.	" "
10699.	" "	14283.	" "
10700.	" "	14285.	" "
10732.	" "	14286.	" "
10753.	" "	14945.	East coast of United States.
14268.	" "	14946.	" "
14276.	Portland, Maine.		

## 212. *Pomolobus mediocris* (Mitch.) Gill.

5470.	New Bedford, Massachusetts.	16753.	Potomac River.
10624.	Potomac River.	18432.	Saint John's River, Florida.
10646.	Wood's Holl, Massachusetts.	18433.	" "
10647.	" "	19456.	Potomac River.
10671.	" "	19715.	Fort Macon, North Carolina.
10688.	Potomac River.	19751.	East coast of United States.
12500.	Norfolk, Virginia.	19785.	" "
12802.	" "	19871.	New Bedford, Massachusetts.
15237.	Potomac River.		

## 213. *Clupea harengus* Linnaeus.

14217.	Eastport, Maine.	14259.	Wood's Holl, Massachusetts.
14218.	" "	14757.	Eastport, Maine.
14220.	" "	14758.	" "
14230.	" "	17567.	" "
14232.	" "	17568.	" "
14235.	" "	17569.	" "
14238.	Portland, Maine.	17570.	" "
14241.	" "	17571.	" "
14242.	" "	17572.	" "
14245.	" "	17573.	" "
14248.	" "	21687.	Ipswich Bay, Massachusetts.
14251.	" "	22366.	Wood's Holl, Massachusetts.
14256.	Wood's Holl, Massachusetts.	24526.	" "
14257.	" "		

## DOROSOMIDÆ.

### 214. *Dorosoma cepedianum* (Lac.) Gill.

12314.	Washington Market.	17138.	Potomac River.
12315.	" "	17139.	" "
12803.	Norfolk, Virginia.	17140.	" "
14901.	Potomac River.	17141.	" "
15073.	New York Market.	18435.	Saint John's River, Florida.
17131.	Potomac River.	18436.	" "
17132.	" "	18437.	" "
17133.	" "	18529.	Kinston, North Carolina.
17134.	" "	18530.	" "
17135.	" "	19873.	East coast of United States.
17136.	" "	24678.	Washington Market.
17137.	" "	24975.	" "

## ENGRAULIDÆ.

### 215. *Engraulis vittatus* (Mitch.) Bd. & Girard.

19003.	Wood's Holl, Massachusetts.	19011.	Wood's Holl, Massachusetts.
19004.	" "	19012.	" "
19005.	" "	19013.	" "
19006.	" "	19014.	" "
19007.	" "	19015.	" "
19008.	" "	19016.	" "
19009.	" "	19017.	" "
19010.	" "		



## CATOSTOMIDÆ.

216. *Myxostoma macrolepidota* (LeS.) Jor.

24850. Washington Market.  
24895. " "

24898. Washington Market.

217. *Erimyzon sucetta* (Lac.) Jor.

18245. Potomac River.  
18246. " "  
18247. " "  
18248. " "

18249. Potomac River.  
18250. " "  
18251. " "  
24897. Washington Market.

218. *Hyptentelium nigricans* (LeS.) Jordan.

*Catostomus nigricans* LeSueur.

7679. Yellow Creek, Ohio.  
8303. Aux Plaines, Illinois.  
8762. " "  
9152. Illinois.

15357. Susquehanna River, Pennsylvania.  
19868. Yellow Creek, Ohio.  
19870. " " "

219. *Catostomus commersonii* (Lac.) Jordan.

6853. Port Huron, Wisconsin.  
7677. Cleveland, Ohio.  
7706. " "  
7777. Wisconsin.  
7781. " "  
8409. Yellow Creek, Ohio.  
8440. Racine, Wisconsin.  
8457. Port Huron, Wisconsin.  
8501. Detroit River, Michigan.  
8728. Huron River, Wisconsin.  
8870. Alabama.

8984. Cleveland, Ohio.  
9054. Racine, Wisconsin.  
9059. Ohio.  
9170. Western States.  
9207. Lake Champlain.  
9393. Ecorse, Michigan.  
9646. " "  
20097. Sing Sing, New York.  
20241. Near Richmond, Indiana.  
20268. Root River, Wisconsin.  
24849. Washington Market.

220. *Catostomus longirostrum* LeS.

8437. Essex County, New York.

## CYPRINIDÆ.

221. *Hybopsis amarus* (Grd.) Cope.

15379. Chapman's Point, Maryland.

222. *Luxilus cornutus* (Mitch.) Jordan.

7377. Yellow Creek, Ohio.  
8556. " "  
9431. Aux Plaines River, Illinois.

15358. Susquehanna River, Pennsylvania.  
19850. Aux Plaines River, Illinois.

223. *Semotilus corporalis* (Mitch.) Putnam.

7435. Westport, New York.  
8308. Root River, Wisconsin.  
8336. Westport, Lake Champlain.  
8741. Black River, Ohio.

8833. Black Warrior River, Alabama.  
8956. Racine, Wisconsin.  
8965. Quebec, Canada.

224. *Semotilus bullaris* (Raf.) Jordan.

*Semotilus rhotheus* Cope.

*Semotilus argenteus* (Storer) Putnam.

7823. New England, and New York.  
8775. " "  
8979. " "  
8985. " "  
9107. " "  
9645. " "

12933. South Hadley Falls, Massachusetts.  
15404. " "  
19848. New England and New York.  
19869. Sing Sing, New York.  
22857. Schoodic Lake, Maine.

225. *Ceraticthys biguttatus* (Kirt.) Girard.

6816. Black River, Ohio.  
15361. Bainbridge, Pennsylvania.

18019. Bainbridge, Pennsylvania.

**226. *Rhinichthys cataractæ* (C. & V.) Jordan.**

*Rhinichthys nasutus* (Ayres) Ag.

8505. Carlisle, Pennsylvania.

**227. *Notemigonus americanus* (L.) Jordon.**

9247.	Washington Market.	18329.	Saint John's River, Florida.
11074.	Sandusky, Ohio.	18330.	" "
11152.	" "	18331.	" "
11153.	" "	19063.	" "
11154.	" "	19064.	" "
17792.	" "	19065.	" "
17793.	" "	19066.	" "
17794.	" "	19067.	" "
17795.	" "	19068.	" "
18323.	Saint John's River, Florida.	19069.	" "
18324.	" "	23109.	Avoca, North Carolina.
18325.	" "	23110.	" "
18326.	" "	23111.	" "
18327.	" "		

**228. *Exoglossum maxillingua* (LeS.) Haldeman.**

7760.	New York to Ohio and Maryland.	15360.	Bainbridge, Pennsylvania.
9044.	" " "		

**229. *Idus melanotus* Heckel.**

22973. Druid Hill Ponds, Baltimore, Maryland.

**230. *Carassius auratus* (Linn.) Bleeker.**

18290.	Washington Market.	18294.	Washington Market.
18291.	" "	18297.	" "
18292.	" "	20965.	New York Market.
18293.	" "		

**231. *Cyprinus carpio* Linn.**

22964.	Druid Hill Ponds, Baltimore, Md.	22968.	Druid Hill Ponds, Baltimore, Md.
22966.	" " "	22969.	" " "

SILURIDÆ.

**232. *Ichthælus punctatus* (Raf.) Jordan.**

1540.	Cincinnati, Ohio.	12250.	Cincinnati, Ohio.
8882.	Michigan.	12251.	" "
11118.	Sandusky, Ohio.	12252.	" "
11123.	" "	12282.	" "
12247.	Cincinnati, Ohio.	12283.	" "
12248.	" "	21268.	Saint John's River, Florida.
12249.	" "		

**233. *Amiurus nigricans* (LeS.) Gill.**

21269.	Saint John's River, Florida.	21270.	Saint John's River, Florida.
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**234. *Amiurus albidus* (LeS.) Gill.**

1486.	Potomac River.	23190.	Washington Market.
15352.	Bainbridge, Pennsylvania.	23191.	" "
19930.	Washington Market.	24851.	" "
20299.	Havre de Grace, Maryland.	24893.	" "
23188.	Philadelphia, Pennsylvania.		

**235. *Amiurus lophius* Cope.**

15829.	Huntington, Maryland.	15830.	Huntington, Maryland.
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**236. *Amiurus natalis* (LeS.) Gill var. *lividus* (Raf.).**

8847.	Western and Southern United States.	9220.	Western and Southern United States. (7).
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**237. *Amiurus vulgaris* (Thomp.) Nelson var. *ælorus* (Grd.).**

1507. North Red River, Minnesota.

**238. *Amiurus catus* (L.) Gill.***Amiurus nebulosus* (LeS.) Gill.

1433.	Sing Sing, New York.	18283.	Washington Market.
1479.	Chesapeake Bay.	18284.	"
8444.	Washington Market.	18285.	"
8695.	"	18286.	"
9085.	"	18287.	"
9730.	Philadelphia, Pennsylvania.	18288.	"
9732.	Washington Market.	18289.	"
12949.	South Hadley Falls, Massachusetts.	19453.	Potomac River.
15353.	Bainbridge, Pennsylvania.	20378.	South Hadley Falls, Massachusetts.
18278.	Washington Market.	20454.	Wilkes Barre, Pennsylvania.
18279.	"	22108.	Washington Market.
18280.	"	23186.	Potomac River.
18281.	"	23189.	"
18282.	"	24852.	Washington Market.

**239. *Amiurus melas* (Raf.) Jordan & Copeland.**

1497.	Northfield, Illinois.	1525.	Patapsco River.
1514.	Racine, Wisconsin.	7597.	Cook County, Illinois.

**240. *Noturus insignis* (Rich.) Gill & Jordan.***Noturus marginatus* Baird.

1470.	James River, Virginia.	19454.	Potomac River.
15354.	Bainbridge, Pennsylvania.	23187.	"
18012.	" "	23196.	"
18016.	" "		

**241. *Noturus exilis* Nelson.**

1438.	South Grand River, Missouri.
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**242. *Noturus gyrinus* (Mitch.) Raf.**

1430.	Near Piermont, New York.
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**243. *Ariopsis felis* (L.) Gill & Jordan.**

22751.	?
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## CONGRIDÆ.

**244. *Conger oceanica* (Mitch.) Gill.**

19495.	Beaufort, North Carolina.	22797.	East coast of United States.
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## ANGUILLIDÆ.

**245. *Anguilla rostrata* (LeS.) De Kay.***Anguilla bostoniensis* (LeS.) De Kay.

13583.	Wood's Holl, Massachusetts.	16115.	Wood's Holl, Massachusetts.
13584.	" "	16146.	" "
13586.	" "	17220.	Noank, Connecticut.
13589.	" "	17221.	" "
13590.	" "	17222.	" "
14051.	Noank, Connecticut.	17223.	" "
14183.	" "	17224.	" "
14184.	" "	17225.	" "
14185.	" "	17226.	" "
14186.	" "	17227.	" "
14188.	" "	17228.	" "
14191.	" "	17229.	" "
14194.	" "	17230.	" "
14195.	" "	20766.	Grand Lake Stream, Maine.
14196.	" "	22654.	Gloucester, Massachusetts.
14200.	" "	22711.	" "
14202.	" "	22910.	" "
14203.	" "	24422.	" "
14211.	Wood's Holl, Massachusetts.	25093.	Wood's Holl, Massachusetts.
14216.	Eastport, Maine.		

SIMENCHELYIDÆ.

246. *Simenchelys parasiticus* Gill.

21675.	Le Have Bank.	24384.	Lat. 42° 48' N., Lon. 63° W., 130 fathoms.
21676.	"	24385.	Lat. 42° 37' N., Lon. 62° 55' W., 200 fathoms.
21849.	Western Bank, 200 fathoms.	24386.	Lat. 43° 05' N., Lon. 61° 03' W., 150 fathoms.
21862.	Banquereau.	24387.	Lat. 44° 12' N., Lon. 58° 56' W., 230 fathoms.
22791.	Grand Banks.	24388.	Lat. 43° 27' N., Lon. 60° W., 150 fathoms.
22794.	Lat. 43° 25' N., Lon. 60° 20' W.	24395.	Lat. 44° 02' N., Lon. 59° W., 300 fathoms.
22888.	Grand Banks.	24414.	Lat. 43° 42' N., Lon. 59° 10' W., 300 fathoms.
23071.	Lat. 44° 17' N., Lon. 58° 10' W., 120 fths.	24426.	Lat. 42° 37' N., Lon. 66° 55' W., 200 fathoms.
23072.	" " "	24427.	" " "
23075.	Banquereau.	24428.	Lat. 44° 12' N., Lon. 58° 56' W., 230 fathoms.
23076.	Lat. 43° 18' N., Lon. 60° 24' W., 250 fths.	24429.	Lat. 43° 27' N., Lon. 60° W., 150 fathoms.
24370.	Lat. 43° 15' N., Lon. 50° 20' W., 200 fths.	24733.	Lat. 43° 48' W., Lon. 59° W., 300 fathoms.

MURÆNIDÆ.

247. *Muræna sanctæ-helenæ*.

20183. Bermuda.

SYNAPHOBRANCHIDÆ.

248. *Synaphobranchus pinnatus* (Gronow) Gthr.

21683.	Le Have Bank.	23145.	Banquereau.
21684.	"	23146.	Lat. 44° 29' N., Lon. 57° 09' W., 250 fathoms.
21685.	"	24209.	Banquereau.
21848.	Western Bank, 200 fathoms.	24210.	"
21860.	Le Have Bank, 150 fathoms.	24216.	Lat. 44° 30' N., Lon. 57° 08' W., 200 fathoms.
21868.	Lat. 43° 23' N., Lon. 60° 40' W., 280 fths.	24271.	Lat. 43° 41' N., Lon. 59° 15' W., 200 fathoms.
21871.	Lat. 59° 50' N., Lon. 43° 25' W., 300 fths.	24272.	Lat. 42° 41' N., Lon. 62° 58' W., 200 fathoms.
22792.	Lat. 42° 47' N., Lon. 63° 10' W.	24352.	Lat. 44° 30' N., Lon. 57° 08' W., 200 fathoms.
22889.	Grand Banks.	24353.	Lat. 47° 20' N., Lon. 50° 48' W., 48 fathoms.
22892.	Grand Banks, 200 fathoms.	24383.	Lat. 43° 25' N., Lon. 60° W., 180 fathoms.
22893.	30 miles S. N. W. light of Sable Island.	24390.	Lat. 44° N., Lon. 58° 30' W., 160 fathoms.
23077.	Lat. 43° 53' N., Lon. 58° 51' W., 250 fths.	24430.	Lat. 43° 05' N., Lon. 61° 03' W., 150 fathoms.
23078.	Lat. 43° 53' N., Lon. 58° 51' W., 250 fths.	24734.	Southern part of Western Bank.
23080.	Near George's Bank.	24735.	Grand Banks, Lat. 44°.
23083.	Banquereau.		

AMIIDÆ.

249. *Amia calva* Linnæus.

3227.	Falls of the Missouri.	18545.	Mississippi Valley.
6702.	Mississippi Valley.	18546.	"
9502.	"	18547.	"
11017.	Sandusky, Ohio.	18548.	"
11018.	" "	18549.	"
11134.	" "	18550.	"
11135.	" "	18551.	"
11137.	" "	18552.	"
11139.	" "	18553.	"
11141.	" "	18555.	"
12495.	" "	23104.	Avoca, North Carolina.
16584.	New York Market.		

LEPIDOSTEIDÆ.

250. *Lepidosteus osseus* (Linn.) Ag.

3236.	Potomac River.	15366.	Potomac River.
6785.	Mississippi Valley.	15449.	"
9510.	"	15450.	"
9512.	"	15451.	"
10637.	Potomac River.	15452.	"
10717.	"	18298.	Saint John's River, Florida.
12493.	Detroit, Michigan.	18523.	Kinston, North Carolina.

18556. Potomac River.  
18558. "  
18559. "  
18560. "  
18561. "  
18562. "  
19048. Florida.  
19444. "  
19445. "  
19446. "

19875. Potomac River.  
22496. "  
23102. Avoca, North Carolina  
25149. Potomac River.  
25151. "  
25153. "  
25154. "  
25155. "  
25158. "

# 251. *Lepidosteus platystomus* Rafinesque.

9505. Great Lakes and W. to Rocky Mts. | 12497. Great Lakes and W. to Rocky Mts.

## POLYODONTIDÆ.

# 252. *Polyodon folium* Lac.

3234. Foxburg, Pa.  
3235. Tennessee.  
12228. Cincinnati, Ohio.  
12229. " "  
12230. " "  
12231. " "  
12232. " "  
12233. " "  
12297. " "

12331. Madison, Indiana.  
12334. " "  
12414. Cincinnati, Ohio.  
15475. Madison, Indiana.  
15480. " "  
15481. " "  
15482. " "  
15483. " "

## ACIPENSERIDÆ.

# 253. *Acipenser oxyrhynchus* Mitchell.

19897. Potomac River.  
20336. "  
22703. "

22956. Potomac River.  
22957. "

# 254. *Acipenser ruthenus* Linnæus.

22974. Baltimore, Maryland.

# 255. *Scaphirhynchops platyrhynchus* (Raf.) Gill.

2565. Cincinnati, Ohio.  
3246. Republican River, Kansas.  
3255. Cincinnati, Ohio.  
12236. " "  
12237. " "  
12238. " "  
12239. " "  
12240. " "  
12241. " "  
12242. " "

12244. Cincinnati, Ohio.  
12245. " "  
12461. " "  
12463. " "  
12473. Yellowstone River.  
15476. Madison, Indiana.  
15478. " "  
15479. " "  
22158. Mt. Carmel, Illinois.

## CHIMÆRIDÆ.

# 256. *Chimæra plumbea* Gill.

21805. Lat. 43° 51' N., Lon. 59° 05' W.  
21858. Le Have Bank,  
21904. Banquereau.  
22642. "  
22667. Grand Banks.  
23912. Banquereau.  
23913. "

23914. Lat. 43° 32' N., Lon. 60° 21' W., 250 fathoms.  
24287. Lat. 42° 37' N., Lon. 62° 55' W., 200 fathoms.  
24303. Lat. 44° 15' N., Lon. 58° 52' W., 250 fathoms.  
24304. Lat. 44° N., Lon. 58° 30' W., 160 fathoms.  
24305. " " "  
24306. Fishing Banks.

## DASYBATIDÆ.

# 257. *Dasybatis centrurus* (Mitch.) Gill, MSS.

22938. ?



RAIIDÆ.

**258. *Raia eglanteria* Lac.**

22270. Gloucester, Massachusetts.  
22661. " "

24203. Provincetown, Massachusetts.

**259. *Raia erinacea* Mitch.**

14156. Wood's Holl, Massachusetts.  
14159. " "  
14160. " "  
14161. " "  
14165. " "  
14169. " "  
14172. " "

14176. Wood's Holl, Massachusetts.  
22320. Gloucester, Massachusetts.  
22386. Noank, Connecticut.  
22887. East coast of United States.  
22954. " "  
24358. Provincetown, Massachusetts.

**260. *Raia ocellata* Mitch.**

14158. Wood's Holl, Massachusetts.  
22886. Gloucester, Massachusetts.  
24226. " "  
24227. " "

24229. Gloucester, Massachusetts.  
24230. " "  
24248. Provincetown, Massachusetts.

**261. *Raia radiata* Donovan.**

21012. Halifax, Nova Scotia.  
21031. " "  
21048. " "  
21502. Salem, Massachusetts.  
21815. Gloucester, Massachusetts.  
22271. " "  
22295. Off Gloucester, Massachusetts.  
22312. Gloucester, Massachusetts.

22662. Gloucester, Massachusetts.  
24310. Provincetown, Massachusetts.  
24354. " "  
24608. Off coast of Nova Scotia.  
24631. " "  
25193. Wood's Holl, Massachusetts.  
25210. Gloucester, Massachusetts.

ODONTASPIDIDÆ.

**262. *Eugomphodus littoralis* Gill.**

22720. East coast of United States.

SPHYRNIDÆ.

**263. *Sphyrna zygaena* (L.) Müll. & Henle.**

22942. East coast of United States.

22943. East coast of United States.

GALEORHINIDÆ.

**264. *Eulamia obscurus* (LeS.) Gill.**

19420. Wood's Holl, Massachusetts.  
19421. " "  
19422. " "

19423. Wood's Holl, Massachusetts.  
19424. " "

**265. *Mustelus canis* (Mitch.) DeKay.**

7298. East coast of United States.  
7301. Beesley's Point, New Jersey.  
14153. Noank, Connecticut.  
14154. " "  
14754. " "  
16006. Wood's Holl, Massachusetts.  
16028. " "  
16213. " "  
16214. " "  
16215. " "  
16242. " "  
16243. " "  
16244. " "

16245. Wood's Holl, Massachusetts.  
16246. " "  
16247. " "  
16248. " "  
16580. " "  
19257. " "  
19425. " "  
19426. " "  
21854. Newport, Rhode Island.  
22712. East coast of United States.  
22941. " "  
23163. Wood's Holl, Massachusetts.

## SPINACIDÆ.

266. *Squalus acanthias* Linnaeus.*Squalus americanus* (Storer) Gill.

19275.	Wood's Holl, Massachusetts.	19921.	Eastport, Maine.
19276.	" "	19923.	" "
19277.	" "	21855.	George's Bank.
19278.	" "	22316.	Gloucester, Massachusetts.
19279.	" "	22660.	" "

267. *Centroscyllium Fabricii* (Rhdt.) Müll. & Henle.

21622.	Lat. 42° 40' N., Lon. 63° 50' W., 250 fths.	23065.	Banquereau.
21686.	George's Bank.	23066.	"
21836.	Off Gloucester, Massachusetts.	23067.	Lat. 44° 20' N., Lon. 57° 57' W.
22281.	" "	24257.	Lat. 43° 25' N., Lon. 60° W., 250 fathoms.
22637.	Le Have Bank.	24300.	Lat. 42° 37' N., Lon. 62° 55' W., 200 fathoms.
22743.	Lat. 43° 56' N., Lon. 59° 04' W.	24392.	" " "
22744.	Banquereau.	24705.	Lat. 43° 27' N., Lon. 51° 47' W., 200 fathoms.
22749.	Sable Island Bank.	24706.	" " "
22878.	Lat. 44° 33' N., Lon. 53° 48' W.	25105.	Grand Banks.
22879.	Lat. 44° 23' N., Lon. 53° 25' W., 200 fths.	25106.	"
22880.	Lat. 44° 38' N., Lon. 57° 09' W., 200 fths.	25111.	Lat. 42° 46' N., Lon. 65° 18' W., 200 fathoms.

268. *Centroscymnus coelepis* Bocage & Capello.

21621.	Lat. 42° 40' N., Lon. 63° 50' W., 260 fths.	23064.	Banquereau.
21833.	Grand Banks.	24295.	Lat. 43° 25' N., Lon. 60° W., 180 fathoms.
21835.	"	24298.	Lat. 42° 15' N., Lon. 58° 52' W., 250 fathoms.
21905.	Banquereau.	24299.	Lat. 42° 37' N., Lon. 62° 55' W., 200 fathoms.
22282.	"	24711.	Lat. 44° N., Lon. 52° 50' W., 250 fathoms.
22668.	Grand Banks, 200 fathoms.		

## MYXINIDÆ.

269. *Myxine glutinosa* Linnaeus.

21679.	Le Have Bank.	23087.	Lat. 44° 18' N., Lon. 58° 24' W., 150 fathoms.
22894.	Lat. 44° 45' N., Lon. 53° 54' W., 400 fths.	23088.	Grand Banks.
22895.	Lat. 45° 03' N., Lon. 54° 30' W., 85 fths.	23089.	Lat. 44° 17' N., Lon. 58° 10' W., 120 fathoms.
22896.	Grand Banks.	23090.	" " "
22897.	"	24204.	Grand Banks.
23085.	Eastern part of George's Bank, 46 fths.	24367.	Banquereau.
23086.	" " "	24725.	Lat. 44° 30' N., Lon. 58° 07' W., 200 fathoms.

WASHINGTON, May 1, 1880.

## THE LITTORAL MARINE FAUNA OF PROVINCETOWN, CAPE COD, MASSACHUSETTS.

By RICHARD RATHBUN.

The species enumerated in the following list were, unless otherwise stated, all collected by the United States Fish Commission during the summer of 1879. As the list, however, represents only a few days' collecting, at intervals when the steamer was not available for dredging purposes, it must be considered as far from complete, especially as regards the smaller forms, while no attempt has been made to include the groups of Entomostraca, Foraminifera, &c. Considering the fact that very little has yet been published concerning the shore animals of this region, I feel justified in offering the list in its present imperfect form in

order to supply more definite information as to the so-called boundary line separating the Northern and Southern New England faunæ.

Rock exposures are entirely wanting about the outer extremity of Cape Cod, and the sandy areas which compose the most of that region are generally of so pure a character as to offer little inducement to animal life in the way of food. The littoral fauna of Provincetown and vicinity is therefore less rich in species than a more diverse region would be. Nevertheless a more diligent search than has hitherto been instituted would undoubtedly result in the finding of many species additional to those given below. Prof. H. E. Webster, who spent the entire summer of 1879 in collecting and studying especially the shore annelids about Provincetown, obtained many new forms not included in this list.

The localities examined in 1879 were about as follows: The inner beach of the cape in front of the town of Provincetown, from the dike on the south to Wood End on the north and from high-water to low-water mark, including the eel-grass areas lying directly off the beach and the broad sand-flats in front of and behind it; the inner beach at Long Point; the piles of the wharves, especially those at the ends of the long steamboat and railroad wharves; and the outer beaches at Wood End, Race Point, &c. A few interesting species obtained at Wellfleet by Professor Webster are included in the list, and I am also indebted to him for material from about Provincetown. The identifications of species are only partly mine. Prof. A. E. Verrill furnishes the lists of worms and Nudibranchs; Prof. S. I. Smith has kindly identified the Amphipods and more difficult Decapods; and Mr. Sanderson Smith the more critical species of Mollusks. Mr. O. Harger has also examined the Isopods. In addition to the species contained in the list, a species of *Chironomus* in the larval stage was found abundantly on the shore, and one or more species of mites were common among Hydroids. Of the one hundred and fifty-seven species included in the list, all but twenty-one were previously known to range both to the north and south of Cape Cod. Of the species whose range has been extended, thirteen belong properly to the fauna of Southern New England and seven to that of Northern New England. The southern species are as follows: *Pallene empusa*, *Pinnixa chactopterana*, *Gebia affinis*, *Maera levis*, *Microdeutopus grandimanus*, *Amphithoe longimana*, *Chelura terebrans*, *Caprella geometrica*, *Leptochelia algicola*, *Sigalion arenicola*, *Sthenelais picta*, *Anthostoma robustum*, and *Leptosynapta roseola*. The northern species are: *Leptochelia caeca*, *Praxilla zonalis*, *Tetrastemma vermiculus*, *Planocera elliptica*, *Embletonia fuscata*, *Stiliger fuscata*, and *Edwardsia sulcata*. The only new littoral species discovered by the Commission, so far as the collections have been worked up, is *Edwardsia pallida*.

Excepting in a few necessary instances the synonymy of the species has been omitted, but references have been given in nearly all cases to American publications in which the synonymy and range of the several species and other information concerning them are discussed.

NEW HAVEN, CONN., April 8, 1880.

## PYCNOGONIDA.

**Pallene empusa** Wilson, Trans. Conn. Acad. Arts and Sciences, vol. v, p. 9, pl. iii, figs. 2a to 2g, 1878.—*Phoxichilidium maxillare* Smith, Inv. of Vineyard Sound, p. 544, 1874 (*non* Stimpson).

Found amongst the eel-grass, low water to  $\frac{1}{2}$  fathom. Former localities: Vineyard Sound (U. S. F. C., 1871) and Noank, Conn. (U. S. F. C., 1874).

## MEROSTOMATA.

**Limulus Polyphemus** Latreille. Smith, Inv. V. S., p. 580, 1874.

Very common along the entire inner shore of the cape, in the vicinity of Provincetown. The living specimens were usually encountered partly buried in the sand, near low-water mark. They sometimes attain a very large size in this region, but the majority of the specimens seen were from small to medium size and females. All the larger specimens collected were males. The cast skins or exuviae were sometimes so abundant that they nearly made up the little ridge of *débris* running along the upper part of the beaches.

Two specimens, both females, were obtained in the act of molting; one was living, the other dead. In the case of the latter the operation of throwing off the old skin had advanced considerably, allowing us to measure accurately the increase in the size of the carapax for the past year. Of the exuvia, the greatest width of the carapax was 57<sup>mm</sup>; length of carapax along the median line, 35<sup>mm</sup>; distance between the tips of the spines surmounting the compound eyes, 31.5<sup>mm</sup>; length of compound eye, 3.5<sup>mm</sup>. The carapax of the newly expanded animal had a width of 67<sup>mm</sup>; length, 45<sup>mm</sup>; distance between the spines of compound eyes, 43<sup>mm</sup>; length of compound eye, 5<sup>mm</sup>. The living specimen had only broken slightly through the outer skin, so that but one measurement could be made without destroying it. The width of the old carapax was 124<sup>mm</sup>, of the new 141<sup>mm</sup>; but as the latter had suffered contraction in alcohol, it must have been larger originally.

## DECAPODA.

**Gelasimus pugnax** Smith, Trans. Conn. Acad., vol. ii, p. 131, 1870; *ibid.*, vol. v, p. 33, 1879; Inv. V. S., p. 545, 1874.

Very abundant on the salt marshes and upper part of the beaches, between the town and Wood End Light. Also found at the same place by Prof. S. I. Smith and Mr. O. Harger, in 1872.

**Gelasimus pugilator** Latreille. Smith, Trans. Conn. Acad., vol. ii, p. 136, 1870; *ibid.*, vol. v, p. 33, 1879; Inv. V. S., p. 545, 1874.

A few specimens only of this species have been noticed from Provincetown; they were found on the beach near the dike in 1872, by Smith and Harger.



*Pinnixa chætopterana* Stimp., Ann. Lyc. N. H., New York, vol. vii, p. 235, 1860.

Wellfleet, 1879; collected by Prof. H. E. Webster, who found it in great abundance in the tubes of *Amphitrite ornata*, on the flats near the town.

*Platyonichus ocellatus* Latr. Smith, Inv. V. S., p. 547, 1874; Trans. Conn. Acad., vol. v, p. 33, 1879.

Extremely abundant everywhere along the inner shore, in the vicinity of Provincetown, at low water and deeper. Large numbers were observed to be molting during August and the last of July, and fresh exuviae were very common all through the latter half of the summer. One small specimen obtained while molting, and preserved in alcohol, afforded the following measurements: length of carapax in the exuvia, 35<sup>mm</sup>; width, 42<sup>mm</sup>; length of freshly expanded carapax, partly contracted in alcohol, 38<sup>mm</sup>; width, 47<sup>mm</sup>. The largest specimen taken on the shore measured: length of carapax, 71<sup>mm</sup>; width, 86<sup>mm</sup>. On August 16, and during one or more succeeding days, the young were seen swimming at the surface in countless numbers, but how far from the shore they extended was not determined; they were very plentiful about the end of the long steamboat wharf. They varied in length of carapax from about 11<sup>mm</sup> to 16<sup>mm</sup>. September 3 they were again abundant, but less so than on the former occasion, and they remained nearer the shore, or at least closer to the bottom. At this time they were from 18<sup>mm</sup> to 23<sup>mm</sup> long.

*Carcinus mænas* (Linné) Leach. Smith, Trans. Conn. Acad., vol. v, p. 34, 1879.—*C. granulatus* Smith, Inv. V. S., p. 547, 1874.

Collected by Smith and Harger, 1872.

*Panopeus depressus* Smith, Proc. Bos. Soc. N. H., vol. xii, p. 283, 1859; Inv. V. S., p. 547, 1874; Trans. Conn. Acad., vol. v, p. 37, 1879.

Collected by Smith and Harger, 1872.

*Panopeus Sayi* Smith, Proc. Bos. Soc. N. H., vol. xii, p. 284, 1859; Inv. V. S., p. 547, 1874; Trans. Conn. Acad., vol. v, p. 37, 1879.

Found abundantly in the eel-grass off the dike, and also collected by Smith and Harger, 1872.

*Cancer irroratus* Say. Smith, Trans. Conn. Acad., vol. v, p. 38, 1879.

Common; shore, at low water.

*Libinia emarginata* Leach. Smith, Trans. Conn. Acad., vol. v, p. 45, 1879.—*L. cænaliculata* Smith, Inv. V. S., p. 548, 1874.

Very abundant at low water, Provincetown; several very large males were also obtained from Wellfleet Harbor, the largest measuring: length of carapax, 113<sup>mm</sup>; width, excluding spines, 103<sup>mm</sup>.

*Eupagurus longicarpus* (Say) Stimp. Smith, Inv. V. S., p. 549, 1874; Trans. Conn. Acad., vol. v, p. 47, 1879.

Very abundant.



*Gebia affinis* Say. Smith, Inv. V. S., p. 549, 1874.

This species was not collected at Provincetown, but was obtained from the flats at Wellfleet by Prof. H. E. Webster, in 1879, and seems to be abundant there. This is the first time it has been recorded from the north side of Cape Cod.

*Crangon vulgaris* Fabr. Smith, Inv. V. S., p. 550, 1874; Trans. Conn. Acad., vol. v, p. 55, 1879.

Very common along the shore.

*Palæmonetes vulgaris* (Say) Stimp. Smith, Inv. V. S., p. 550, 1874; Trans. Conn. Acad., vol. v, p. 88, 1879.

Only a very few specimens of this species were collected, although it was diligently sought for. These were found in the eel-grass in front of the town and off the dike.

### SCHIZOPODA.

*Mysis stenolepis* Smith, Inv. V. S., p. 551, 1874; Trans. Conn. Acad., vol. v, p. 103, 1879.

A few specimens only were collected; they were from the eel-grass in front of the town.

### AMPHIPODA.

*Orchestia agilis* Smith, Inv. V. S., p. 555, 1874.

Very abundant on the beaches, under dead sea-weeds, etc.

*Talorchestia longicornis* (Say) Smith, Inv. V. S., p. 556, 1874.

Very abundant on both the outer and inner beaches, burrowing deeply into the sand, about high-tide level.

*Talorchestia megalopthalma* (Bate) Smith, Inv. V. S., p. 556, 1874.

Associated with the preceding.

*Hyale littoralis* (Stimp.) Smith, Inv. V. S., p. 556, 1874.

Collected in 1879; and also in 1872, by Smith and Harger.

*Calliopius læviusculus* (Kroy.) Boeck. Smith, Inv. V. S., p. 557, 1874.

Found upon the beach at Long Point among stranded sea-weeds.

*Gammarus locusta* (Linné) Fabr., Systema Entomologia, 1775. Gould, Inv. Mass., ed. I, p. 334, 1841. Smith, Bull. U. S. Nat. Mus., No. 15, p. 139, 1879.—*G. ornatus* Edwards, Ann. des Sci. Nat., tome xx, p. 367, 1830; Hist. Nat. des Crust., tome iii, p. 47, 1840. Smith, Inv. V. S., p. 557, 1874.

Only a few specimens of small size were obtained from the eel-grass in various places. The scarcity of this species at Provincetown is probably due to the absence of rocks and of much rock-weed, which together form its favorite grounds. A comparison of European with American specimens has enabled Professor Smith to establish the identity of *G. ornatus* and *G. locusta*.

**Gammarus annulatus** Smith, Inv. V. S., p. 557, 1874.

Shore and flats at low water, and eel-grass; abundant.

**Gammarus mucronatus** Say, Journ. Phila. Acad., vol. i, p. 376, 1818. Smith, Inv. V. S., p. 559, 1874.

Shore and flats at low water; very abundant.

**Mæra levis** Smith, Inv. V. S., p. 559, 1874.

In the eel-grass off the dike. Not hitherto recorded from north of Vineyard Sound.

**Microdeutopus grandimanus** Smith.—*Autonoë grandimana* Bruz., Skand. Amphip. Gaum., p. 26, 1859.—*Microdeutopus minax* Smith, Inv. V. S., p. 562, 1874.

On the shore at low water, in the eel-grass off the dike, and among the sea-weeds on the piles of the wharves. Formerly known on the American coast only from Vineyard and Long Island Sounds.

**Amphithoë longimana** Smith, Inv. V. S., p. 563, 1874.

Found at low water and in the eel-grass in one-half fathom. Previously known only from south of Cape Cod.

**Corophium cylindricum** (Say) Smith, Inv. V. S., p. 566, 1874.

Eel-grass, one-half fathom.

**Chelura terebrans** Philippi. Smith, Proc. U. S. Nat. Mus., vol. ii, p. 232, 1879.

Abundant in old submerged piles of wharves, associated with *Limnoria lignorum* and *Teredo navalis*. First recorded from America in the paper of Professor Smith referred to above, but previously found by him at Wood's Holl in 1875.

**Caprella geometrica** Say, Journ. Acad. Nat. Sci., Phila., vol. i, p. 390, 1818. Smith, Inv. V. S., p. 567, pl. v, fig. 20, 1874.

In the eel-grass, one-half fathom, and also obtained from floating sea-weeds in Provincetown Harbor. Hitherto recorded from south of Cape Cod only, but discovered by the Fish Commission at Quahog Bay, Maine, in 1873.

## ISOPODA.

**Jæra albifrons** Leach. Harger, Proc. U. S. Nat. Mus., vol. ii, p. 158, 1879.—*Jæra copiosa* Stimpson, Mar. Inv. Grand Manan, p. 40, 1853. Harger, Inv. V. S., p. 571, 1874.

Very abundant on the shore between tides, under loose stones and other objects; and also in the eel-grass in very shallow water.

**Chiridotea cæca** (Say) Harger, Am. Journ. Sci., III, vol. xv, p. 374, 1878.

Shore, low water; only a few specimens collected.

**Idotea irrorata** (Say) Edwards. Harger, Inv. V. S., p. 569, 1874; Proc. U. S. Nat. Mus., vol. ii, p. 160, 1879.—*Idotea tricuspidata* Desm., Dict. des Sci. Nat., tome xxviii, p. 373, 1823.

Very abundant on the shore, on piles of wharves, in the eel-grass, and swimming at the surface amongst floating sea-weeds.

*Idotea phosphorea* Harger, Inv. V. S., p. 569, 1874.

Occasionally found swimming at the surface in Provincetown Harbor, and also upon the beach, with stranded sea-weeds.

*Epelys trilobus* (Say) Smith, Inv. V. S., p. 571, pl. vi, fig. 28, 1874. Harger, Proc. U. S. Nat. Mus., vol. ii, p. 160, 1879.

Moderately abundant; shore, between tides, and in the eel-grass, one-half fathom; only specimens of small to medium size were met with.

*Sphæroma quadridentatum* Say. Harger, Proc. U. S. Nat. Mus., vol. ii, p. 161, 1879.

Abundant, but only specimens of small size were obtained; low water and between tides on the shore and flats, and upon eel-grass, in one-half fathom.

*Limnoria lignorum* (Rathke) White. Harger, Proc. U. S. Nat. Mus., vol. ii, p. 161, 1879.

In piles of old wharves, in company with *Leptochelia algicola* and *Chelura terebrans*.

*Leptochelia algicola* Harger, Proc. U. S. Nat. Mus., vol. ii, p. 162, 1879.—*Paratanais algicola* Harger, Am. Journ. Sci., III, vol. xv, p. 377, 1878.

Very abundant at low water, on eel-grass, in one-half fathom, and in old piles, associated with *Limnoria lignorum* and *Chelura*.

*Leptochelia cœca* Harger, Proc. U. S. Nat. Mus., vol. ii, p. 164, 1879.

A single specimen only of this species was recognized among the shore collections.

### CIRRIPIEDIA.

*Balanus balanoides* (Linné) Stimp., Mar. Inv. of Grand Manan, p. 39, 1853. Smith, Inv. V. S., p. 579, 1874.

Common on piles of wharves, on shells, stones, and wood on the beaches, and occasionally found on floating fucus. On the piles it was usually of small size, but on stones lying on the beaches it often exceeded half an inch in diameter.

*Lepas fascicularis* Ellis and Sol. Smith, Inv. V. S., p. 579, 1874.

On floating fucus in the harbor.

### ANNELIDA.

*Lepidonotus squamatus* Leach. Verrill, Invertebrate Animals of Vineyard Sound, p. 581, pl. 10, figs. 40, 41, 1874.

On the piles of wharves.

*Harmothoe imbricata* Malmg. Ver., Inv. V. S., p. 582, 1874.

Piles of wharves.

*Sigalion arenicola* Ver., Proc. U. S. Nat. Mus., vol. ii, p. 167, 1879.

Shore, in sand, at low water.

*Sthenelais picta* Ver., Inv. V. S., p. 582, 1874; Proc. U. S. Nat. Mus., vol. ii, p. 167, 1879.

Shore, in sand, at low water.

*Nephtys ciliata* Rathke. Ver., Inv. V. S., p. 583, 1874.

Shore, in sand.

*Phyllodoce catenula* Ver., Inv. V. S., p. 587, 1874.

Piles of wharves.

*Eulalia pistacia* Ver., Inv. V. S., p. 584, 1874.

Piles of wharves.

*Autolytus cornutus* A. Ag., Jour. Bos. Soc. N. H., p. 392, 1863. Ver., Inv. V. S., p. 590, pl. 13, figs. 65, 66, 1874.

Piles of wharves, and among eel-grass near the beach.

*Nereis limbata* Ehlers. Ver., Inv. V. S., p. 590, pl. 11, fig. 51, 1874.

Shore, in sand, and among eel-grass.

*Nereis virens* Sars. Ver., Inv. V. S., p. 590, pl. 11, figs. 47-50, 1874.

Shore, in sand.

*Lumbrinereis fragilis* A. and E. Ver., Inv. V. S., p. 594, 1874 (*Lumbriconereis*).

Shore, in sand.

*Lumbrinereis tenuis* Ver., Check List, p. 8, 1879; Inv. V. S., p. 594, 1874 (*Lumbriconereis*).

Shore, in sand.

*Arabella opalina* Ver., Check List, p. 8, 1879; Inv. V. S., p. 594, pl. 13, figs. 69, 70, 1874 (*Lumbriconereis*).

Shore, in sand.

*Goniada gracilis* Ver., Proc. U. S. Nat. Mus., vol. ii, p. 174, 1879.—*Eone gracilis* Ver., Inv. V. S., p. 596, 1874.

Shore, in sand.

*Rhynchobolus dibranchiatus* Ver., Inv. V. S., p. 596, pl. 10, figs. 43, 44, 1874.

Shore, in sand.

*Anthostoma fragile* Ver., Inv. V. S., p. 593, 1874.

Shore, in sand.

*Anthostoma robustum* Ver., Inv. V. S., p. 597, pl. 14, fig. 76, 1874.

Shore, in sand.

*Scolecopsis viridis* Ver., Inv. V. S., p. 600, 1874.

Shore, in sand.

*Polydora ciliatum* Clapar. (?) Ver., Inv. V. S., p. 603, pl. 14, fig. 78, 1874.

Shore, in sand.

*Cirratulus grandis* Ver., Inv. V. S., p. 606, pl. 15, figs. 80, 81, 1874.

Shore, in sand.

*Notomastus luridus* Ver., Inv. V. S., p. 610, 1874.

Shore, in sand.

*Notomastus filiformis* Ver., Inv. V. S., p. 611, 1874.

Shore, in sand.

*Praxilla zonalis* Ver., Proc. Am. Ass. Adv. Sci., 1873, p. 384.

Shore, in sand.

*Clymenella torquata* Ver., Inv. V. S., p. 608, pl. 14, figs. 71-73, 1874.

Shore, in sand.

*Cistenides Gouldii* Ver., Inv. V. S., p. 612, pl. 17, figs. 87, 87a, 1874.

Shore, in sand.

*Nicolea simplex* Ver., Inv. V. S., p. 613, 1874.

Piles of wharf, and eel-grass.

*Scionopsis palmata* Ver., Inv. V. S., p. 614, 1874.

Piles of wharf.

*Polycirrus eximius* Ver., Inv. V. S., p. 616, pl. 16, fig. 85, 1874.

Shore, in sand, and piles of wharf.

*Fabricia stellaris* Blainv.—*Fabricia Leidyi* Ver., Inv. V. S., p. 619, 1874.

Piles of wharf.

*Hydroides dianthus* Ver., Check List, p. 11, 1879; Inv. V. S., p. 620, 1874 (*Serpula*).

On piles of wharves, and incrusting living and dead shells of *Pecten irradians*, *Ensatella americana*, *Littorina littorea*, *Anomia glabra*, &c.; also on fucus and other objects; especially abundant in the vicinity of the dike.

*Spirorbis borealis* Daud. Ver., Inv. V. S., p. 621, 1874.

On fucus growing on the piles and floating at the surface; abundant.

*Clitellio irrorata* Ver., Inv. V. S., p. 622, 1874.

Shore, in sand, near high-water mark.

*Halodrilus littoralis* Ver., Inv. V. S., p. 623, 1874.

On the beach, under dead sea-weeds near high-water mark.

## GEPHYREA.

*Phascolosoma Gouldii* Dies. Ver., Inv. V. S., p. 627, pl. 18, fig. 93, 1874.

Shore, in sand.

## ENTEROPNEUSTA.

*Balanoglossus aurantiacus* Ver., Inv. V. S., p. 627, 1874.

Shore, in sand.

## NEMERTINA.

*Tetrastemma dorsalis* M'Int. Ver., Am. Journ. Sci., vol. x, p. 40, 1875.

Piles of wharves.

*Tetrastemma vermiculus* Ehr. (?) Ver., Proc. U. S. Nat. Mus., p. 184, 1879.

Piles of wharves.



**Lineus viridis** Ver., Am. Journ. Sci., vol. x, p. 40, 1875; Inv. V. S., p. 628, 1874 (*Nemertes*).

Piles of wharves.

**Cerebratulus ingens** (Leidy) Ver., Check List, p. 12, 1879; Inv. V. S., p. 630, 1874 (*Meckelia*).

Shore, in sand.

**Cerebratulus roseus** (Leidy) Ver., Check List, p. 12, 1879; Inv. V. S., p. 630, 1874 (*Meckelia*).

Shore, in sand.

## TURBELLARIA.\*

**Planocera elliptica** Gir., Proc. Bos. Soc. Nat. Hist., p. 251, 1850.

Piles of wharves, and on the shore under bits of wood, &c.

**Bdelloura candida** Gir. Ver., Inv. V. S., p. 634, 1874.

Parasitic on *Limulus Polyphemus*.

## CEPHALOPODA.

**Ommastrephes illecebrosa** (Les.) Ver., Inv. V. S., p. 634, 1874.—*O. sagittatus* Binney, in Gould, Inv. Mass., ed. II, p. 510, 1870.

This species is caught in Provincetown Harbor during the summer and early fall in considerable numbers, to use for bait, and is often stranded upon the beaches at low tide. Prof. S. I. Smith and Mr. Oscar Harger, while at Provincetown in 1872, noticed large numbers of this squid about the docks, killing and eating young mackerel. Their observations on the habits and appearance of the creature made at that time are given in the report of the United States Fish Commission for 1871-72, pp. 441, 442, 1874.

**Loligo Pealei** Les. Binney, in Gould, Inv. Mass., II, p. 514, 1870. Ver., Inv. V. S., p. 635, 1874.

This species was not encountered at Provincetown by the Fish Commission, but it is represented in the collection of Mr. J. H. Blake, of that place, by two pens taken from specimens caught in the harbor, in July, 1879. It is not abundant north of Cape Cod, although several specimens were procured at Annisquam, on the north side of Cape Ann, by Professor Hyatt, in 1878, and it has also been previously noticed from Massachusetts Bay.

## GASTEROPODA.

**Ilyanassa obsoleta** (Say) Stimp. Ver., Inv. V. S., p. 641, 1874. Gould, Inv. Mass., II, p. 362, 1870 (*Nassa*).

Very common on many of the inner beaches, and extending up to high-tide level. It is especially abundant in places where the brackish water from ponds runs down the face of the beach as it is left uncovered by the tide.

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\* About six species of *Rhabdocala* were collected, but they have not been determined.

**Purpura lapillus** (Linné) Lam. Gould, Inv. Mass., II, p. 360, 1870. Ver., Inv. V. S., p. 642, 1874.

Shore, rare.

**Anachis avara** (Say) Perkins. Ver., Inv. V. S., p. 643, 1874. Gould, Inv. Mass., I, p. 313, 1841; II, p. 356, 1870 (*Columbella*).

Rare; only a single specimen was found by the writer, but others have collected it at Provincetown.

**Astyris lunata** (Say) Dall. Ver., Inv. V. S., p. 645, 1874.—*Columbella lunata* Gould, Inv. Mass., II, p. 359, 1870.

Abundant in the eel-grass in front of the town and off the dike.

**Lunatia heros** (Say) Adams. Gould, Inv. Mass., II, p. 338, 1870. Ver., Inv. V. S., p. 646, 1874.

Very common along the entire inner shore, and often picked up dead on the outer beaches.

**Neverita duplicata** (Say) Stimp. Gould, Inv. Mass., II, p. 345, 1870. Ver., Inv. V. S., p. 646, 1874.

Abundant, associated with *Lunatia heros*.

**Littorinella minuta** (Totten) Stimp. Ver., Inv. V. S., p. 653, 1874. Gould, Inv. Mass., II, p. 298, 1870 (*Rissoa*).

Common, shore at low water.

**Skenea planorbis** (Fabr.) Forbes and Hanley. Gould, Inv. Mass., II, p. 296, 1870. Ver., Inv. V. S., p. 655, 1874.

Common on the shore, with *Tottenia gemma*, *Littorinella minuta*, &c., and also on the piles of wharves.

**Littorina littorea** (Linné) Johnston. Gould, Inv. Mass., II, p. 308, 1870.

Very abundant on the shore, on piles of wharves, and on eel-grass which is more or less exposed at low tide. Just off the dike it occurs on the eel-grass in countless numbers, and, in common with all the other species of shells in that vicinity, is frequently covered with the white calcareous tubes of *Hydroides dianthus*.

**Littorina rudis** (Maton) Gould, Inv. Mass., I, p. 257, 1841; II, p. 304, 1870. Ver., Inv. V. S., p. 651, 1874.—*L. tenebrosa* Gould, Inv. Mass., I, p. 259; II, p. 306.

This is an exceedingly common species on the shore.

**Littorina palliata** (Say) Gould, Inv. Mass., I, p. 260, 1841; II, p. 309, 1870. Ver., Inv. V. S., p. 652, 1874.

Common on the shore and on piles of wharves among sea-weeds.

**Lacuna vineta** (Mont.) Turton. Gould, Inv. Mass., II, p. 302, 1870. Ver., Inv. V. S., p. 652, 1874.

On the eel-grass, shallow water; not found in much abundance.

**Bittium nigrum** (Totten) Stimp. Gould, Inv. Mass., II, p. 321, 1870. Ver., Inv. V. S., p. 648, 1874.

Very abundant amongst the eel-grass, in shallow water in front of the town, and off the dike, and also on the beaches, where it often occurs in immense numbers.

**Crepidula fornicata** (Linné) Lamarek. Gould, Inv. Mass., II, p. 271, 1870. Ver., Inv. V. S., p. 649, 1874.

Common, especially in the vicinity of the dike, on shells of *Pecten* and *Ensatella*.

**Crepidula plana** Say. Gould, Inv. Mass., II, p. 272, 1870. Ver., Inv. V. S., p. 650, 1874.

Common off the dike, and also found elsewhere.

**Crepidula convexa** Say. Gould, Inv. Mass., II, p. 273, 1870. Ver., Inv. V. S., p. 650, 1874.

Abundant off the dike, adhering to the surfaces of living and dead shells, to *Limulus*, and other objects.

**Acmaea testudinalis** (Müller) Forbes and Hanley. Ver., Inv. V. S., p. 661, 1874. Gould, Inv. Mass., II, p. 267, 1870 (*Tectura*).

Rare, shore; variety *alveus* also found.

**Odostomia bisuturalis** (Say) Gould, Inv. Mass., II, p. 327, 1870. Ver., Inv. V. S., p. 656, 1874.

Not uncommon; eel-grass off the dike, and elsewhere.

**Odostomia trifida** (Totten) Gould, Inv. Mass., I, p. 274, 1841; II, p. 328, 1870. Ver., Inv. V. S., p. 656, 1874.

Associated with the last, and about equally common.

**Odostomia dealbata** Stimp. Gould, Inv. Mass., II, p. 327, 1870. Ver., Inv. V. S., p. 656, 1874.

A single specimen only was obtained from the eel-grass off the dike.

**Melampus lineatus** Say, Am. Conch., p. 85, 1822.—*Melampus bidentatus* Say. Gould, Inv. Mass., II, p. 467, 1870. Ver., Inv. V. S., p. 662, 1874 (*non* Mont.).

Abundant, shore, between tides.

**Onchidoris**, sp.

An undetermined species of this genus was obtained from sea-weeds on the inner beach at Long Point.

**Tergipes despectus** Ald. and Han. Ver., Inv. V. S., p. 667, 1874.—*Æolis* (*Tergipes*) *despecta* Gould, Inv. Mass., II, p. 248, 1870.

From hydroids, on piles of wharves, and sea-weeds of beach.

**Embletonia fuscata** Gould, Inv. Mass., II, p. 251, 1870.

Found among the filamentous green algae in little rills of water on the beaches and sand-flats.

**Stiliger fuscata** Bergh. Ver., Prelim. Check List, p. 23, 1879.—*Calliopæa* (?) *fuscata* Gould, Inv. Mass., II, p. 250, 1870.

Associated with *Embletonia fuscata*.

## LAMELLIBRANCHIATA.

***Teredo navalis*** Linné. Gould, Inv. Mass., II, p. 28, 1870. Ver., Inv. V. S., p. 669, 1874.

Very abundant in the piles at the outer end of steamboat wharf, and in other situations. A few years ago about forty feet of the above-mentioned wharf was so weakened by the borings of this shell-fish that it completely gave way under the weight of a ship's load of merchandise stored upon it.

***Teredo megotara*** Hanley. Gould, Inv. Mass., II, p. 30, 1870. Ver., Inv. V. S., p. 670, 1874.

At Provincetown, in cedar buoys (Gould).

***Teredo dilatata*** Stimp. Gould, Inv. Mass., II, p. 32, 1870. Ver., Inv. V. S., p. 670, 1874.

From pine buoy attached to lobster pots, at Provincetown (Gould).

***Ensatella americana*** (Gould) Ver., Am. Journ. Sci., vol. iii, pp. 212, 284, 1872; Inv. V. S., p. 674, 1874.—*Solen americanus* Gould, Inv. Mass., II, p. 42, 1870.

Many dead adult shells and living young were collected on the sand-flats at low water.

***Mya arenaria*** Linné. Gould, Inv. Mass., II, p. 55, 1870. Ver., Inv. V. S., p. 672, 1874.

Very abundant on the shores and flats; especially so on the broad flats between the town and Wood End Light House, where, in the clean sands, the shells are often of a nearly pure white.

***Lyonsia hyalina*** Con. Gould, Inv. Mass., II, p. 64, 1870. Ver., Inv. V. S., p. 672, 1874.

Quite common at low water on the inner shore at Provincetown, and in the inlet behind Race Point Light House. It was also picked up in extreme abundance on the outer beach at Race Point.

***Cochlodesma Leanum*** (Say) Couth. Gould, Inv. Mass., II, p. 68, 1870. Ver., Inv. V. S., p. 673, 1874.

Dead shells in fresh condition were collected on the outer beach at Race Point, but not on the inner.

***Spisula solidissima*** (Dillw.) Gray.—*Macra solidissima* Gould, Inv. Mass., II, p. 73, 1870. Ver., Inv. V. S., p. 680, 1874.

Living young and adult dead shells were frequently found on the shore at low water.

***Ceronia arcata*** (Con.) Adams. Gould, Inv. Mass., II, p. 80, 1870. Ver., Inv. V. S., p. 679, 1874.

Many living specimens were obtained by Prof. H. E. Webster in the inlet behind Race Point Light House and on the outer beach near the same place; not known from the inner shore.

**Cumingia tellinoides** Con. Gould, Inv. Mass., II, p. 79, 1870. Ver., Inv. V. S., p. 679, 1874.

Not found by the Fish Commission, but several dead shells were collected on the inner beaches by Mr. J. H. Blake, of Cambridge, and Dr. Crocker, of Provincetown.

**Angulus tener** (Say) Adams. Ver., Inv. V. S., p. 677, 1874. Gould, Inv. Mass., II, p. 97, 1870 (*Tellina*).

Abundant on the shore, low water.

**Venus mercenaria** Linné. Gould, Inv. Mass., II, p. 133, 1870. Ver., Inv. V. S., p. 681, 1874.

Rare on the beaches at Provincetown, but very common farther south on the inner shores of the cape, especially in the neighborhood of Wellfleet, where they attain a large size and have the purple coloration of the interior of the shell more than usually intense and widespread.

**Tottenia gemma** (Totten) Perkins. Ver., Inv. V. S., p. 682, 1874.

Very abundant on the beaches in company with *Skenea planorbis* and *Littorinella minuta*, and also found amongst the eel-grass. The small dark-colored shells of this species are frequently scattered over the white beaches in the greatest profusion, appearing like coarse grains of black sand. But, being lighter than the sand, they are readily blown along by the wind until they collect in large numbers in the lee of any prominence that may present itself, and in the furrows of the beaches. In such places as these several handfuls of pure shells, with little admixture of sand, may often be scooped up. The first specimens of this species obtained by General Totten, its earliest describer, were from the beach at Provincetown.

**Lævicardium Mortoni** (Con.) Perkins. Ver., Inv. V. S., p. 683, 1874. Gould, Inv. Mass., II, p. 143, 1870 (*Liocardium*).

Low water, rare.

**Cryptodon Gouldii** (Phil.) Adams. Gould, Inv. Mass., II, p. 100, 1870. Ver., Inv. V. S., p. 686, 1874.

Dead shells frequently found along the beaches; probably lives in shallow water close to the shore, but not dredged in Cape Cod Bay in less than thirteen fathoms, at which depth it was very abundant.

**Solemya velum** Say. Gould, Inv. Mass., II, p. 48, 1870.—*Solenomya velum* Ver., Inv. V. S., p. 688, 1874.

A few dead valves only were picked up on the inner beaches.

**Astarte castanea** Say. Gould, Inv. Mass., II, p. 117, 1870. Ver., Inv. V. S., p. 685, 1874.

Found abundantly in Provincetown Harbor, west and north of the light-house, at low-water mark (Gould). Although searched for at this locality in 1879, no specimens were discovered; a very low tide is probably required to uncover them. Mr. J. H. Blake says they are also common low down on the inner shore, near Wood End Light.



*Argina pexata* (Say) Gray. Ver., Inv. V. S., p. 692, 1874. Gould, Inv. Mass., II, p. 147, 1870 (*Area*).

Collected on the beach at Provincetown (S. I. Smith, 1872).

*Mytilus edulis* Linné. Gould, Inv. Mass., II, p. 183, 1870. Ver., Inv. V. S., p. 692, 1874.

Very abundant, shore, piles of wharves, attached to floating fucus, &c.

*Modiola plicatula* Lam. Gould, Inv. Mass., II, p. 188, 1870. Ver., Inv. V. S., p. 693, 1874.

Very abundant on the flats near high-water mark.

*Crenella glandula* (Totten) Adams. Gould, Inv. Mass., II, p. 194, 1870. Ver., Inv. V. S., p. 695, 1874.

A few fresh, but not living, shells were obtained from the beaches at low water. Provincetown, at low water (Stimpson, Shells of N. England). This species was first known to Totten, its describer, from Provincetown.

*Pecten irradians* Lam. Gould, Inv. Mass., II, p. 199, 1870. Ver., Inv. V. S., p. 695, 1874.

This species was formerly very abundant in front of the town, in the patches of eel-grass just below ordinary low-tide level, but at present the full-grown shells are rarely found there. They are, however, still very plentiful off the dike in similar situations. The adult shells rest on the ground amongst the eel-grass, which at low water becomes thickly matted above them, generally quite concealing them. Young shells usually adhere to the eel-grass by their byssus.

*Anomia glabra* Ver., Am. Journ. Sci., vol. iii, p. 213, 1872; Inv. V. S., p. 696, 1874.—*A. ephippium, electrica, squamula*, Gould (*non* Linné).

Abundant on the flats in front of the dike, but generally of small size, attached to dead shells of *Pecten irradians*, *Ensatella americana*, &c.

## TUNICATA.

*Molgula manhattensis* Ver., Am. Journ. Sci., vol. i, p. 54, 1871; Inv. V. S., p. 699, 1874.

Abundant near high-tide level, amongst the grass in the pools left on the shore at low tide; attached to eel-grass and to floating sea-weeds. Also thrown up in immense numbers on the outer beach at Race Point during heavy storms.

*Botryllus Gouldii* Ver., Am. Journ. Sci., vol. i, p. 211, 1871; Inv. V. S., p. 702, 1874.

Growing on eel-grass in shallow water and on floating sea-weeds, &c.

## BRYOZOA.

*Crisia eburnea* Lamour. Ver., Inv. V. S., p. 707, 1874.

Very abundant on fucus and eel-grass, often associated with *Bugula turrita*; on eel-grass everywhere in shallow water from the dike to Long Point, and on fucus growing on the piles and floating at the surface.

**Tubulipora serpens** (Linné) Flem., Brit. Anim., p. 529, t. Johnston, Hist. Brit. Zoöph., p. 275, 1847.—*T. flabellaris* Ver., Inv. V. S., p. 708, 1874.

Found very abundantly on the eel-grass in shallow water, forming small rounded clusters.

**Flustrella hispida** (Fabr.) Gray.—*Acyonidium hispidum* Smitt. Ver., Inv. V. S., p. 708, 1874.

Incrusting floating fucus in the harbor, and probably also occurring on the sea-weeds of the piles.

**Vesicularia**, sp.

One or two small specimens of a *Vesicularia* with creeping stem, possibly *V. ura* Smitt, were found upon fucus growing upon the piles.

**Bugula turrita** (Desor) Ver., Inv. V. S., p. 712, pl. xxxiv, figs. 258, 259, 1874.

Very abundant on piles of wharves, eel-grass in shallow water, and on floating fucus; associated with *Crisia eburnea*.

**Electra pilosa** (Linné) Fisch., t. Ver., Preliminary Check List Mar. Inv. Atl. Coast, p. 29, 1879.—*Membranipora pilosa* Farre, Phil. Trans., p. 412, 1837. Ver., Inv. V. S., p. 712, 1874.

Incrusting fucus, laminaria, eel-grass, &c, floating in the harbor, and stranded on the beaches.

**Cribrellina puncturata** Smitt, Floridan Bryozoa, part II, p. 24, 1873.—*Escharipora punctata* Smitt, Öfvers. af K. Vetens.-Akad. Förh., 1868, appendix, p. 4. Ver., Inv. V. S., p. 713, 1874.

On eel-grass, one-half fathom, rare.

**Hippothoa hyalina** (Linné) Smitt, Floridan Bryozoa, part II, p. 40, 1873.—*Mollia hyalina* Smitt, Öfvers. af K. Vetens.-Akad. Förh., 1868, appendix, p. 16. Ver., Inv. V. S., p. 713, 1874.

On floating fucus and eel-grass in the harbor, and on the beaches.

**Lepralia americana** Ver., Am. Journ. Sci., III, vol. ix, p. 415, pl. vii, figs. 4, 5, 1875.—*Lepralia Pallasiana* Ver. Inv. V. S., p. 713, 1874 (with query; *non* Busk).

Very common; incrusting fucus and other sea-weeds on the piles, and also growing on eel-grass in shallow water.

## ECHINODERMATA.

**Leptosynapta Girardii** (Poultres) Ver., Inv. V. S., p. 716, 1874.

This species is common everywhere about Provincetown, on the sandy beaches between low-tide and half-tide levels, but it is most abundant on the sandy flats about midway between the town and Wood End Light House, where large areas are left dry for a considerable time at low water. It also occurs in abundance on the sand-flats inside of Race Point Light House, on the outer shore.

**Leptosynapta roseola** Ver., Inv. V. S., p. 716, 1874.

Provincetown beach, and sheltered inlets back of Race Point, on the outer side of Cape Cod, buried in the sand at low water, and associated

with *L. Girardii*. Collected at the latter place by Prof. H. E. Webster and Mr. Benedict. Hitherto known only from New Haven, Conn., and Vineyard Sound (Verrill).

**Asterias Forbesii** (Desor) Ver., Am. Journ. Sci., vol. xi., p. 418, 1876; Proc. Bos. Soc. Nat. Hist., vol. x, p. 345, 1866; Inv. V. S., p. 718, 1874.—*A. arenicola* Stimp., Proc. Bos. Soc. Nat. Hist., vol. viii, p. 268, 1862. Ver., *ibid.*, vol. x, p. 339, 1866; Inv. V. S., p. 718, 1874.—*Asteracanthion berylinus* Ag., A. Ag., Mem. Mus. Comp. Zool., vol. v, No. 1, p. 94, pl. ix, 1877.

Very abundant along the shore above and below low-water mark, and on piles of wharves, but always of comparatively small size. A comparison of the specimens from Provincetown with those obtained from Gloucester in 1878 shows more or less constant differences to exist between the two. In the former the spines are generally longer and more acute, sometimes even quite slender, and the pedicellariæ appear to be somewhat more numerous, and to vary greatly in their arrangement. These differences are, however, of very slight value in this exceedingly variable species.

**Asterias vulgaris** Stimp., MSS. Packard, Can. Nat., Dec., 1863. Ver., Proc. Bos. Soc. Nat. Hist., vol. x, p. 347, 1866; Inv. V. S., p. 718, 1874.

Below low-water mark at the outer ends of the long wharves.

**Amphipholis elegans** Ljung. Ver., Inv. V. S., p. 720, 1874.—*Amphiura squamata* Lyman, Illust. Cat. Mus. Comp. Zool., No. I, p. 121, 1865 (*non* Delle Chiaje, t. Ljung.).

Only a few specimens of this Ophiuran were obtained; they were from the eel-grass in very shallow water.

## ANTHOZOA.

**Metridium marginatum** M.-Edw. Ver., Inv. V. S., p. 738, 1874.

Common on the mooring posts in the harbor (J. H. Blake).

**Edwardsia sulcata** Ver., Mem. Bos. Soc. N. H., vol. i, No. I, p. 29, 1864.

Sand, at low water.

**Edwardsia pallida** Ver., Proc. U. S. Nat. Mus., vol. ii, p. 198, 1879.

In sand, at low water.

## ACALEPHÆ.

**Clytia Johnstoni** (Alder) Hincks. Ver., Inv. V. S., p. 725, 1874.

On floating fucus thrown up on inner beach of Long Point.

**Campanularia flexuosa** Hincks. Ver., Inv. V. S., p. 726, 1874.

Abundant on fucus of piles of wharves, &c.

**Obelia geniculata** (Linné) Allman. Ver., Inv. V. S., p. 727, 1874.

On floating fucus stranded on Long Point beach, inner shore.

**Obelia dichotoma** (Linné) Hincks. Ver., Inv. V. S., p. 728, 1874.

Very abundant on eel-grass, one-half fathom.

*Sertularia pumila* Linné. Ver., Inv. V. S., p. 732, 1874.

Very common, and growing principally on fucus, on piles of wharves; also on floating fucus in the harbor. A very robust variety was collected from fucus stranded on the outer beach at Race Point.

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**DESCRIPTION OF A NEW SPECIES OF RAY (*RAIA STELLULATA*)  
FROM MONTEREY, CALIFORNIA.**

**By DAVID S. JORDAN and CHARLES H. GILBERT.**

*Raia stellulata* sp. nov.

Allied to *Raia radula* Delaroche. Disk much broader than long, anteriorly broadly arched, and convex, the tip of the snout very slightly exserted. Anterior margin of pectorals undulated, convex anteriorly, then concave. Length of snout from eyes a little more than twice the width of the interocular space, which is concave, less than the distance between the outer angles of the spiracles. Breadth of disk equal to the distance from the tip of the tail to the shoulder-girdle. Length of tail equal to the distance from its root to the middle of the interocular area.

Male everywhere above rough with stellate prickles, the base of the pectorals being almost smooth. Along the middle region of the back and the whole upper surface of the tail is a band of close-set, rather low prickles, with broad, very distinctly stellate bases. An elongate patch of stout, recurved spines on the anterior part of the pectorals, and farther back the usual series of claw-like spines found in the males of all species. Stout spines above the eye, a few in the middle of the shoulder, and along the middle line of the tail. Sides of the tail without large prickles. Lower side smooth, except around the mouth.

Female everywhere above rough with stellate prickles, the anterior region, middle of back, and upper surface of tail most so. A median row of strong spines on the tail above, and six on the scapular region. A series of strong spines over the eye. A lateral row of rather strong prickles on the tail. Body smooth below, except anteriorly.

Tail flat below, with a conspicuous lateral fold. Dorsal fins low, their height equal to the interorbital space, separated by a space considerably shorter than their base. Caudal fin reduced to a very small fold, as in the "genus" *Uraptera*, to which this species would be referred in Müller & Henle's arrangement.

Mouth somewhat arched. Teeth not very sharp, tricuspid, about  $\frac{35 \text{ to } 40}{35}$ . Nasal flaps slightly fringed externally. Distance between nostrils about equal to the distance from them to the tip of the snout.

Color grayish-brown, everywhere mottled with light and dark colors, the markings sharp and distinct. Numerous black spots of all sizes, some of them ocellated. A black spot about as large as the eye at the



base of each pectoral, each surrounded by a pale ring and in turn by another dark one. Head with black cross-bars. The two sexes entirely similar in color.

This species is not uncommon in the Bay of Monterey. We have obtained eight examples, which agree with each other very closely. One of these is a female, about 18 inches in length, in which the ovaries are immature. The other females are about 30 inches in length, and the ovaries are fully matured, containing eggs. The males are about 30 inches long, likewise bearing evidences of maturity. These specimens are now in the United States National Museum. This species is readily distinguished from the two others known from the Pacific coast by its obtuse snout and its rough skin.

The *Raia binoculata* Girard is the common skate of the Pacific coast, and is brought in in large numbers to the San Francisco markets. In color it is uniform light brown, with a black ring near the base of each pectoral, and usually a dusky crescent on each ventral. The pectoral ocellus is often obscure, and sometimes can hardly be traced in preserved examples; in living specimens it is generally conspicuous.

The skin in the male is entirely smooth above, except the anterior edge of the pectorals, the bony part of the snout, and the larger spines on the front part of the pectorals, the supraocular region, a few (one to six) on the scapular region, and a series along the median line of the tail. There are two or three detached spines usually along the side of the tail. The claw-like pectoral spines are also present. The females have, in addition, a lateral series of spines on the tail and some prickles on the posterior part of the pectorals, the larger spines found on the pectorals of the male being wanting. The actual length of the snout in *R. binoculata* is not much greater than in *R. stellulata*, but its form is different, the disk being anteriorly acuminate, bounded by concave lines, its length being more than three times the interocular space. Male and female examples of this species, with ripe eggs, or well-developed elaspers, are about two feet long.

Still another ray is known to us from a female example from Monterey about 30 inches in length. It agrees with *R. binoculata* in every respect, except in the form of the snout, which is extremely long, acuminate, and pointed, its length nearly four times the interorbital width. The anterior outline of the disk on each side of the snout forms a nearly uniform concave curve, it being scarcely at all undulated. These differences are shown by the appended table of measurements. We consider this at present a variety of *Raia binoculata*, although such variations in the length of the snout are unusual in the same species.

Still another form is known to us from two examples, a male and a female, each about 6 feet in length, taken at Monterey. This form must be considered as the *Raia cooperi* Girard, as the very imperfect description of the latter species agrees in all essential respects with these specimens.



*Raia cooperi* has the snout acutely produced, rather more so than in *R. binoculara*, though less than in the variety referred to, the distance from the eye to the tip of the snout being about twice the interorbital width. The length of the disk is  $\frac{7}{8}$  its width; the tail is  $\frac{2}{3}$  the length of the disk. The female is covered above with small stellate prickles, which are larger over the eye, on posterior edge of pectorals, on ventrals, the middle line of the back, and on the tail. Prickles on tail in several series. Differentiated spines present only over eye and on tail. The male is nearly smooth, its spines essentially as in *R. binoculara*. Color brown, with paler blotches; a large, obscure, blackish blotch at base of pectoral. This species has scarcely a trace of caudal fin, and is therefore likewise an "*Uraptera*." Its teeth are about  $\frac{44}{40}$ . Whether this *Raia cooperi* is a distinct species or merely very old individuals of *Raia binoculara* we are now unable to decide. There are no important differences, except such as might accompany increased age.

Table of measurements.

	<i>Raia stellulata</i> . ♀	<i>Raia binoculara</i> . ♂	<i>Raia binoculara</i> var. ? ♀
Extreme length, in inches.....	17.45	21.6	23.8
Length of disk, in inches.....	10.10	13.00	18.4
Disk:			
Greatest width (hundredths of length of disk).....	121	106	103
Greatest width at front of eyes.....	58	45.5	41
Width of snout, midway between eyes and tip of snout.....	41	16.7	14
Distance from snout to first gill-opening.....	43	50.5	-----
Distance between first gill-openings.....	31.5	25.5	-----
Distance between last gill-openings.....	18	14.3	-----
Distance from first to last gill-openings.....	14	12.8	12
Width of mouth.....	18	15	15.5
Width of interorbital space.....	8	7	8
Distance from snout to mouth.....	24	21.5	30
Diameter of orbit.....	8	6.2	5.5
Tail:			
Length.....	71.5	67	57
Distance between dorsals.....	5	3.8	3
Height of first dorsal.....	8	8	-----
Length of base of first dorsal.....	7.5	7.6	7

MONTEREY, CAL., April 7, 1880.

DESCRIPTIONS OF NEW SPECIES OF XIPHISTER AND APODICH-  
THYS, FROM MONTEREY, CALIFORNIA.

By DAVID S. JORDAN and CHARLES H. GILBERT.

1. *Xiphister chirus* sp. nov.

Body elongate, somewhat compressed, formed as in *Xiphister mucosus* (*Xiphidion mucosum* Girard). Head short, convex in profile, not depressed above the eyes. Mouth small, oblique, the maxillary extending to opposite middle of pupil. Eye small, as long as snout, about 5 in head. Lower jaw slightly projecting. Teeth strong, the anterior canine-like, bluntish; four canines in lower jaw, *six or more in the upper*, similar

to the posterior teeth, but somewhat enlarged. Lateral teeth of lower jaw short, blunt, the series extending behind the anterior canines. Lips full, the upper protractile. Head naked. Gill membranes united, without isthmus.

Body covered with minute scales, the usual three parallel lateral lines running without union from the head to the tail. Each of these, as in other species, with a series of simple, transverse, alternating, short branches at right angles, and each with one or two open pores. These branches correspond in the outer lines each to a dorsal or anal ray. Middle line farther from each of the outer lines than these are from the dorsal or anal. A short dorsal line, similar to the lateral lines and similarly branched, extending from the occiput to the first dorsal spine. An abdominal line on each side of the belly. These *gradually* converge anteriorly and meet on the breast. They *are not connected with the lower lateral line*. In the other species of the genus the lower lateral line sends a branch to the abdominal line.

The vertical fins are similar in all the species, the dorsal of low sharp spines only; the anal similar, but composed of soft rays, both slightly joined to the caudal.

*Dorsal fin beginning close behind the pectoral*, at a distance from the opercular angle not greater than the diameter of the eye. Anal beginning about a head's length nearer the snout than the base of the caudal, or about  $1\frac{1}{2}$  head's lengths nearer snout than end of caudal.

Pectoral fin quite small, *but several times larger than in any of the other species*, larger than the eye, its length about equal to the distance between the middle and lower lateral lines.

Fin rays: D. LXX; A. 50; P. 14.

Color olive-brown, yellowish below; the sides everywhere with marblings of different shades of brown, mostly in the form of vertical bars. Some round black spots along the back and upper part of the sides; a black spot behind opercles. Head brown above, yellowish below; a narrow black streak from eye directly backward across the temporal region. *Numerous black spots on sides of head, but no radiating bands*. Dorsal and anal fins with black spots; pectorals plain yellowish, a conspicuous dark axillary spot; caudal plain reddish.

This species differs from the others of the genus in the large pectorals, the absence of anterior union of the lower lateral and the abdominal lines, in the position of the first rays of dorsal and anal, in the presence of more than two canines in the upper jaw, and in the coloration, the sides of the head being without stripes and the caudal plain.

It is known to us from about twelve examples taken at the Point of Los Pinos, near Monterey. It inhabits rocks at the extreme low-tide mark, and is abundant chiefly among the masses of mussels which cover the outermost rocks exposed to the wash of the waves. Like the other species of the genus, it is very active and makes its way readily out of water over damp rocks and algæ. It seems to reach a smaller size than the other species.

**2. *Xiphister rupestris* sp. nov.**

Besides the foregoing species, which is distinguishable at sight from *Xiphister mucosus*, a second species occurs in great abundance among the rocks about Monterey. This species is more nearly allied to *X. mucosus*, agreeing with it in form of body, mouth, teeth, and arrangement of the lateral lines; differing in the coloration of the head, in the number of dorsal and anal rays, in the insertion of the dorsal and anal fins, and in the size of the pectoral fins. A description of these points will suffice, without the enumeration of features common to all the species of the genus.

The life coloration of *Xiphister mucosus* is blackish green, becoming pale green on the belly and sides of the head; toward the tail the blackish is commonly broken with much olive-green in various patterns; a transverse light-greenish bar at base of caudal, which extends to the dorsal and anal fins. Radiating backward from the eye are three olive-brown streaks, these much lighter in the center and edged above and below with blackish, outside of which is sometimes a streak of light green. These streaks all merge backward in the olive-green of the head. The upper streak from the eye toward the occiput is generally obsolete or small and indistinct; the middle streak is wedge-shaped, with the edges straight or nearly so; it is but slightly more than one-third the length of the head; the third streak terminates before reaching the margin of the preopercle. A very old example, over a foot long, has a diffuse yellow blotch on the back anteriorly.

In *Xiphister rupestris* the life coloration is olive-brown or reddish brown, uniform or variously marked and shaded with lighter; a light olivaceous bar at base of caudal, extending on dorsal and anal; behind this a blackish area; the tip of the caudal usually pale. Three long, well-defined streaks radiating backward from the eye, these streaks uniform black, overlaying the olive cheeks, and abruptly margined with very light olive; the upper streak is more distinct than in *X. mucosus*; the central streak proceeds straight backward from the eye, half the breadth of the cheeks, at which point it is broadest; it is then narrowed and bent abruptly downward; both the middle and lower streak reach the margin of the preopercle, the length of the middle streak being three-sevenths that of the head.

In *Xiphister mucosus* the dorsal fin begins anteriorly, nearly as in *Xiphister chirus*, the distance from its origin to the occiput being less than that from the occiput to the tip of the snout. The origin of the anal fin is nearly midway from the snout to the tip of the caudal, it being nearer the snout than the tip of the caudal fin by from one-third to two-thirds the length of the head. The fin rays are pretty constantly D. LXXIII, A. 48. The pectoral fin is as long as the eye.

In *Xiphister rupestris* the dorsal fin begins farther back, the distance from its origin to the occiput being one-third greater than the distance from the occiput to the snout. The anal fin begins much in advance of the

middle of the body, the distance from the first ray to the tip of the caudal exceeding the distance to the snout by nearly twice the length of the head. The fin rays are very constantly D. LXVI, A. 50. Pectoral fin very short, its length less than the diameter of the eye (about three-fifths).

These two species are extremely and equally abundant about Monterey, especially on the Point of Pines. They live under rocks in the sand, in crevices of rocks, and in masses of algæ between tide-marks. They are very active, making their way readily on land, and remaining out of water in damp places for hours without inconvenience. We have procured upwards of a hundred specimens of each species, and find the distinctive characters, although few, to be very constant.

*Xiphister cruoreus* (*Xiphidium cruoreum* Cope, Proc. Am. Philos. Soc., 1873), from Alaska, is apparently either identical with *Xiphister mucosus* or closely allied to it. The description agrees better with *mucosus* than with *rupestris*.

The systematic position of the genus *Xiphister* deserves a moment's notice. Professor Gill has referred it to a family, "*Xiphidiontidae*," distinguished from "*Stichæida*" chiefly by the absence of pyloric cæca, and from "*Cebedichthyida*" by the short intestinal canal, the absence of pyloric cæca, and the absence of soft rays in the dorsal.

As a matter of fact, the intestinal canal in *Xiphister* is but little shorter than in *Cebedichthys*. It has *five or six well-developed pyloric cæca*. Whatever may be the value of the family "*Stichæida*," the writers do not believe that *Cebedichthys*, *Xiphister*, and *Apodichthys* are representatives of distinct families. The lateral line of *Cebedichthys*, by the way, corresponds to the upper lateral line of *Xiphister*, and like it has for its whole length a series of short lateral branches ending in open pores.

Table of measurements.

	<i>X. chirus</i> .	<i>X. mucosus</i> , 1.	<i>X. mucosus</i> , 2.	<i>X. rupestris</i> , 1.	<i>X. rupestris</i> , 2.
Total length, inches.....	4.08	10.90	6.70	7.08	6.25
Length to base of caudal = 100.....	3.90	10.40	6.40	6.75	6.10
Body:					
Greatest depth.....	10	12.9	13	10	.....
Least depth.....	.....	4.3	3.8	.....	.....
Head:					
Greatest length.....	14	13.7	14	15.4	15
Distance from snout to nape.....	.....	8.4	8.5	.....	10
Interorbital area.....	.....	2	.....	1.8	.....
Length of maxillary.....	.....	5.7	5	6.3	.....
Diameter of orbit.....	2.5	1.7	.....	2	.....
Dorsal:					
Distance from snout.....	15.5	16	15	21	21.5
Height.....	.....	3	.....	3	.....
Anal, distance from snout.....	43	51.5	51.5	44.5	43
Caudal, length.....	.....	4.7	.....	.....	.....
Pectoral, length.....	3	1.7	.....	1.5	.....
Pectoral, width.....	2.5	.....	.....	1	.....
Dorsal rays.....	76	73	.....	66	.....
Anal rays.....	50	48	.....	50	.....



3. *Apodichthys fucorum* sp. nov.

Allied to *Apodichthys flavidus* Girard, but differing in the form of the anal spine, in the smaller number of fin-rays, and in the smaller size of the pectoral fins.

Form of head and body and dentition as in *Apodichthys flavidus*. Mouth very oblique, the maxillary reaching the vertical from the center of the pupil. Dorsal fin beginning at a point considerably nearer the nape than the latter is from the end of the snout. *Anal spine small*, its length about one-fifth that of the head, *transversely very convex in front, and slightly concave or grooved behind*. Pectoral fins very small, about one-fifth the length of the head. Anal fin beginning nearer base of caudal than tip of snout by about three times the length of the head. Dorsal, very constantly, LXXXIII; A. 35.

In *Apodichthys flavidus* the dorsal begins as much behind the nape as the latter is behind the tip of the snout. The *anal spine is very large*, two-fifths the length of the head, and *deeply excavated on its anterior surface and very convex behind*, the spine being very thin and with sharp edges, resembling a quill-pen.

Pectoral fins larger, about two-fifths the length of the head. Anal beginning nearer base of caudal than tip of snout by twice the length of the head. Fin rays: D. XCIII; A. 40.

The life coloration of *Apodichthys fucorum* is either bright olive-green or brownish red, becoming in alcohol either bright straw color or vermillion; a row of dark spots extending along axis of body, these sometimes with light-bluish center, and connected by a very narrow dark streak. Generally a dark streak downward from eye, but no other markings about the head.

The ground-color of these fishes, whether red, green, yellow, or brown, has no significance in specific distinction. As with many other species of rock-fish, they take the color of their surroundings. When in masses of *Fucus*, this species is always olive-green; when among *Chondrus*, or other red-brown algæ, it is colored like the plants. We have seen *Oligocottus maculosus* (which species is ordinarily brownish, mottled, the belly blue) dark grayish red in pools lined with *Corallina*, deep crimson when surrounded by brighter algæ, plain gray in pools with granite bottoms and no plants, and of the most intense grass-green when taken from among fronds of *Ulva*. Other fishes imitate exactly the brown branches of the kelp (*Macrocystis*). Thus the names *flavidus*, *virescens*, and *sanguineus* have been successively applied to differently colored examples of *Apodichthys flavidus*.

Our specimens of the latter species are orange-red, everywhere dusted with minute punctulations. A few pale round spots on axis of body posteriorly. A narrow jet-black bar downward and backward from eye, falling behind the maxillary; a shorter black streak from eye toward occiput. Anal fin obliquely barred with brownish.

*Apodichthys fucorum* is exceedingly abundant about the Point of Los



Pinos, near Monterey. It is found mostly in masses of *Fucus* attached to rocks between tide-marks, and it is often found at low tide at a considerable distance from any water, kept damp by the masses of algæ. Sometimes a dozen of them can be shaken from a bunch of algæ attached to a dry rock. It is, like the species of *Xiphister*, very active, moving over stones or sand, and showing less anxiety about the presence of its native element than any other fish known to us. The very numerous typical examples are all of nearly the same size as the one measured below. It probably does not attain so great a size as *Apo-dichthys flavidus*.

We have little doubt that Professor Gill is right in uniting *flavidus* Girard, *virescens* Ayres, and *sanguineus* Gill as one species. Whether *inornatus* Gill is different or not we do not know. At any rate, its number of fin-rays (D. XC, A. 38) will separate it from *A. fucorum*.

Table of measurements.

	<i>A. fucorum</i> .	<i>A. flavidus</i> .
Extreme length, in inches .....	4.35	8.90
Length to base of caudal = 100 .....	4.10	8.50
Body, greatest depth .....	9.5	11
Head:		
Length .....	10	11
Distance from snout to nape .....	8	6
Dorsal, distance from snout .....	13	11.5
Anal:		
Distance from snout .....	68	60
Height of spine .....	2	4
Length of pectoral .....	2	4
Dorsal rays .....	83	93
Anal rays .....	35	40

MONTEREY, CAL., April 7, 1880.

#### DESCRIPTION OF A VERY LARGE FOSSIL GASTEROPOD FROM THE STATE OF PUEBLA, MEXICO.

By C. A. WHITE.

The United States National Museum has received from Mr. H. B. Acton, through the Hon. J. W. Foster, United States minister to Mexico, the very interesting fossil shell which is described in the following paragraphs. Mr. Acton says, in a letter accompanying the specimen, that it was obtained from the strata upon which are located the Zapotitlan Salt Works, which works are about six miles southwestward from the town of Tehuacan, in the State of Puebla, Mexico, and about 115 miles inland from the Gulf coast. He gives the elevation of that locality as 6,500 feet above the level of the sea.

Only one example of this species has been received, and it is accompanied with examples of no other species. Fragments of the imbedding rock, which is a dense bluish limestone, have been carefully examined, and although they were found to contain numerous fragments of

fossil shells, not any of them were sufficiently well preserved to indicate even their generic relations. No satisfactory information has been obtained concerning any geological observations that may have been made in that region, which might convey a knowledge of the geological age of the strata of the locality from which the fossil in question was obtained, and I am therefore under the necessity of relying wholly upon the testimony afforded by the fossil itself. The genus to which I have referred it has hitherto been known only in rocks of Cretaceous age; and there appears to be no good reason to doubt that the strata from which this Mexican shell was obtained belong also to that period.

### Genus TYLOSTOMA Sharpe.

#### TYLOSTOMA PRINCEPS (sp. nov.).

(Plate II, figs. 1 and 2.)

Shell very large, general form rhombic-ovate, inflated; spire moderately extended; volutions five or six, convex, having an ill-defined narrow shouldering at the distal or upper portion, adjacent to the suture; umbilicus none, suture impressed; aperture ovate-semilunate, large, its length equal to more than two-thirds the full length of the shell; outer lip forming an approximately regular curve from near the suture to the anterior portion of the aperture, which, although broad, is somewhat produced; margin of the outer lip only slightly sinuate; inner lip bearing a broad, moderately thin callus, its outline somewhat strongly sinuate and its margin narrowly flexed along its anterior portion.

Surface marked by the ordinary lines of growth.

Length from the apex to the front margin of the aperture, 220 millimeters; greatest breadth, 160 millimeters; length of aperture, 150 millimeters. (Museum, No. 8864.)

This is much the largest fossil gasteropod that has ever been found in North American Mesozoic strata; and it is excelled in size by only comparatively few of its class that have since existed.

It has much the general aspect of a *Lunatia*, but it is referred without much hesitation to the genus *Tylostoma* Sharpe. This last-named genus is regarded by some malacologists as having affinities with the Tectibranchiata, near *Pterodonta*; but I agree with Stoliczka and Zittel in referring it to the Pectinibranchiata, and placing it near *Lunatia* in the Naticidæ. It is true that all the characteristics of *Tylostoma*, as enumerated by Sharpe and characteristic of most if not all the species which have been referred to that genus, are not clearly observable upon the only example of this species that has been discovered; but being plainly without an umbilicus, or any umbilical perforation, in connection with its other characteristics, it cannot be referred to any other recognized genus of the Naticidæ. The condition of our example is not such as to show clearly whether or not the outer lip was thickened at the time of the death of the mollusk.

The varices or alternate swellings, characteristic of *Tylostoma*, are present, but not so conspicuous upon this example as they are upon some species of the genus, especially upon *T. mutabilis* Gabb, another Mexican Cretaceous form; but they are quite as conspicuous as they are shown to be in the published figures of Sharpe's type species, *T. torrubia*. These varices or swellings are more apparent in our example by an apical than by a lateral view of it, but their presence is indicated in fig. 2 upon the ultimate and penultimate whorls.

Although size cannot generally be relied upon as a specific character, the extraordinary dimensions of this shell separate it clearly from any other known form with which it might be otherwise in danger of being confounded. The only fossil species which resemble it, or even approximately approach it in size, are the *Natica pedernalis* and *N. præ-grandis* of Roemer, from the Cretaceous of Texas; but both these species evidently belong to a group that is now generally referred to *Lunatia*, or *Euspira*; and the largest known examples of either of these forms have scarcely more than half the dimensions of the example here described.

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**DESCRIPTION OF TWO NEW SPECIES OF SEBASTICHTHYS (SEBASTICHTHYS ENTOMELAS AND SEBASTICHTHYS RHODOCHLORIS), FROM MONTEREY BAY, CALIFORNIA.**

**By DAVID S. JORDAN and CHARLES H. GILBERT.**

*Sebastichthys entomelas* sp. nov.

Allied to *S. ovalis* (Ayres).

Body oblong, rather elongate, the back regularly but not strongly arched, contracted to a rather slender caudal peduncle. Head moderate, the profile less steep than in related species, but the tip of the snout blunter than in *ovalis*. Mouth small, the short maxillary extending to below the middle of the eye. Lower jaw projecting, its tip entering the profile, but considerably less protruding than in *ovalis*. Palatine teeth few.

Preorbital very narrow, without spine. Eye rather large, about 4 in length of head, less than the interorbital space, which is strongly convex, especially in its middle part.

Nasal spines minute. Preocular spine broad, triangular, rather prominent, more conspicuous than in *melaneps*, but much less so than in *ovalis*. Supraocular ridge little developed, its spine minute, sharp, concealed by the scales. Postocular spine present, minute, similarly concealed. No tympanic spine. Occipital ridges scarcely developed, concealed by the scales, without distinct spine at tip. In *ovalis* all these spines, though small, are distinct. In *flavidus* there is no trace of any spines on the cranium, and the ridges are little developed.

Preopercular spines rather small, directed backwards, the two lower obsolete. Opercular spines small, two suprascapular spines. Scales on

top and sides of head very small, present on maxillary, mandible, pre-orbital, and snout.

Scales on body small, in about 65 transverse series.

Gill-rakers numerous, long and slender, their length about half the diameter of the eye.

Dorsal spines very low and slender, the fin moderately emarginate, the membrane joining the last spine at about two-fifths its height. Soft dorsal long and low, the soft rays about as high as the highest spines, a little more than one-third the length of the head. Caudal forked. Anal low, its second spine stronger than third, but scarcely higher, less than two-thirds the height of the first soft ray. Pectoral fins moderate, not reaching vent, their tips beyond tips of ventrals, their base  $3\frac{1}{2}$  in length of head.

Fin rays: D. XIII, 15; A. III, 8.

Color rather dull olive-green. Sides with obscure round rusty spots. Belly, lips, and lower parts tinged with creamy. Obscure light and dark shades across cheeks. Traces of two or three obscure dark vertical bars. Dorsal dusky, with reddish shades. Caudal dusky, the rays olive. Other fins dusky, with creamy reddish at base. Lower half of pectoral distinctly reddish.

Peritoneum *jet-black*.

This species is known to us from five specimens taken in deep water outside of Monterey Bay, in company with *S. ovalis*, *rubrivinctus*, *elongatus*, etc. It is known to the Portuguese fishermen as "*Buda*." Its relations are probably most intimate with *ovalis*, which differs in the following respects:

*Ovalis* is much deeper and more oval in form, with the back considerably more elevated, and the profile much more steep, the lower jaw more protruding. The mouth reaches to the posterior edge of the pupil. The preocular ridge is very strong, forming a large triangular protuberance ending in a spine; small supraocular, postocular, tympanic, and occipital spines are present, the tympanic spine very minute, but constant. The dorsal fin is very low, the *notch between the spinous and soft parts extremely shallow*, the membrane joining the last spine at more than two-thirds its height, the height of the spinous and soft portions about equal. The *second anal spine* is considerably the longest and strongest, scarcely lower than the soft rays. The pectoral fins are long, reaching to the vent.

Anal rays, III, 7, or III, 8.

The color of this species when adult is olivaceous, strongly tinged with pale creamy red, especially below. The membrane of both dorsals are covered with many small round black spots. Some of these are usually present on the body. The upper fins are greenish, the lower more yellowish, and most of them are more or less dusky-edged. Caudal fin rather dark.

Peritoneum black.



The remaining species of this type, *melanops*, *simulans*, and *flavidus*, differ in the absence of any distinct spines on the cranium, as well as in color, form, and other peculiarities. *Melanops* has the preocular ridge considerably developed, and occasionally ending in a spine. The others have this ridge obsolete. The mouth in *simulans* and *flavidus* is considerably larger than in the other species. In *melanops* and *simulans* the fins are slaty black, like the body. In *flavidus* they are olivaceous, the caudal being distinctly brownish yellow (hence the popular name of Yellow-tail). The peritoneum in *flavidus* is pure white, in *melanops* somewhat dusky.

***Sebastichthys rhodochloris* sp. nov.**

Allied to *S. rosaceus* (Girard).

Body oblong, more elongate than in *rosaceus*, the back less elevated, the profile less steep. Mouth comparatively large, but rather smaller than in *rosaceus*, the maxillary not reaching beyond posterior border of pupil. Jaws about equal in the closed mouth, the lower with a small symphyseal prominence. Preorbital narrow, with two bluntish projections. Eye very large, longer than the long snout,  $3\frac{1}{2}$  in head.

Spinous ridges on top of head very high, slender, and sharp, more elevated than in *rosaceus*, *chlorostictus*, and *constellatus*, and sharper. Nasal, preocular, supraocular, postocular, tympanic, and occipital spines present, as in most of the red species. Supraocular ridge long and prominent. Postocular and tympanic spines close behind it, sharp and large. Interorbital space very narrow, its width even posteriorly less than length of supraocular spine (in *rosaceus* considerably more). Interorbital-space with two longitudinal ridges, sharp and conspicuous, not covered by the scales, the very narrow interspace between them strongly concave, the spinous ridges strongly divergent behind.

Preopercular spines sharp, directed backward, the three upper long and pointed, more developed than in *rosaceus*, less radiating than in *chlorostictus*. Two sharp suprascapular spines. Opercular spines short and sharp.

Gill-rakers about as in *rosaceus* and *chlorostictus*, moderately long and slender, much shorter than in *ovalis* or *pinniger*, but longer than in *nebulosus* and *ruber*, the longest gill-raker about one-fourth the diameter of the eye.

Dorsal fin still lower than in *rosaceus*, the membranes little emarginate, the longest spine about  $2\frac{2}{3}$  in head (in *rosaceus*  $2\frac{1}{2}$ ). Emargination of dorsal moderate. Soft rays low, the highest about equal to the highest spine. Caudal fin slightly emarginate.

Second anal spine proportionately longer than in any other of our species, very strong, curved, its length about equal to that of the maxillary or the base of the soft dorsal, or about half the length of the head. It is higher than the soft rays of the anal. Pectoral fins reaching past tips of the ventrals nearly to the anal.

D. XIII, 14; A. III, 6.



Scales moderate, in 58 transverse series, the small accessory scales very numerous.

Ground-color bright clear rose-red, *without any trace of purplish*. Region above the lateral line with much deep green, in the form of reticulating streaks. Below the lateral line the green gives place to bright golden yellow, which is similarly mixed with the red. Top of head with cross-bands of green and red, green streaks radiating from the eye, one to snout, one along maxillary, three across cheeks and opercles, and one across temporal region.

Four bright pale pink spots on the sides of the back, arranged as in *rosaceus*, *constellatus*, and *chlorostictus*; the color brighter than in these species, and entirely devoid of the purplish ring which is found in *rosaceus*; one spot is under the fourth dorsal spine, one near the lateral line under eighth dorsal spine, one under junction of spinous and soft rays, and one under the last soft ray. The first and third of these spots are each surrounded by a distinct ring of green. Another pink spot on the tip of the opercle. A distinct pale area behind eye. Dorsal with the rays red and the membranes olive-green. Caudal and anal with the rays red and the membranes golden. Pectorals red, dashed with olive. Ventrals red. Under parts of head and the inside of the month pale red, unspotted.

In *S. rosaceus* the red on head above, and around the pink spots on the sides, is distinctly purple-red. The yellow or olive on the back and sides blends with the red instead of forming distinct reticulations, and there is little if any green on the back or fins. The lateral line is clear red, usually not crossed by the olive marks.

*Sebastichthys rhodochloris* occurs in abundance in the deep waters of the Bay of Monterey. It is a small fish, like *S. rosaceus*, and rarely reaches a weight of more than a pound. It is known to the fishermen of Monterey by the name of "Fly-fish," *S. rosaceus* being called "Corsair."

One fisherman who procured a number of them for us, on being told that his "Fly-fish" was very much like the "Corsair," summed up the relationships of the two as follows: "You bet it is like it, but it is a different kind of fish."

The following species of "rock-fish" were obtained by us in Monterey Bay. The names used by the fishermen of Monterey are appended. Most of these are evidently names in use for other species at the Azores, transferred to species of Californian waters:

- S. paucispinis* ..... Meron, Tom-cod, Jack-fish.
- S. flavidus* . . . . . Yellow-tail.
- S. simulans* .....
- S. melanops*..... Pesce Pretre (Priest-fish, from its color).
- S. entomelas* ..... Buda.
- S. ovalis* ..... Vinva (Widow).

<i>S. atrovirens</i> .....	Garrupa (Vera).
<i>S. pinniger</i> .....	Flaum.
<i>S. miniatus</i> .....	Rasher.
<i>S. auriculatus</i> .....	
<i>S. proriger</i> .....	
<i>S. elongatus</i> .....	Reña.
<i>S. vexillaris</i> .....	Yellow Garrupa.
<i>S. chlorostictus</i> .....	Pesce Vermiglia.
<i>S. rhodochloris</i> .....	Fly-fish.
<i>S. rosaceus</i> .....	Corsair.
<i>S. constellatus</i> .....	Bagre.
<i>S. ruber</i> .....	Tambor.
<i>S. rubrivinctus</i> .....	Spanish Flag.
<i>S. rostrelliger</i> .....	Garrupa.
<i>S. maliger</i> .....	
<i>S. carnatus</i> .....	Red Garrupa.
<i>S. nebulosus</i> .....	
<i>S. fasciolaris</i> .....	Spotted Garrupa.
<i>S. serriiceps</i> .....	Tree-fish.

Table of measurements.

	<i>Entomelas</i> (Monterey).	<i>Ovalis</i> (Monterey).	<i>Melanops</i> (Sta. Barbara).	<i>Flavivus</i> (Monterey).	<i>Rhodochloris</i> (Monterey).	<i>Rosaceus</i> (Monterey).
Extreme length, inches. ....	12	13	12.25	14.90	9.10	8.85
Length to base caudal, inches = 100. ....	10	11	10.10	12.05	7.90	7.55
Body:						
Greatest height. ....	29.5	35	36	33.8	34	36
Least height. ....	9	9	11	11.5	9	-----
Head:						
Length. ....	30.5	32	31.6	36.5	39.5	35
Diameter of eye. ....	7.8	8	7.3	8.5	12	10
Maxillary. ....	12.5	11.5	13	16	18.5	19.5
Width interorbital area. ....	8.7	8	9.5	9.3	5	6
Longest gill-rakers. ....	5	5	3.8	5	3	3.5
Supraocular spine. ....	-----	-----	-----	-----	8	5
Occipital spine. ....	-----	-----	-----	-----	7.5	7
Dorsal:						
Height highest spine. ....	12	13	11.3	13.7	15	16
Highest soft ray. ....	12.5	12	15	17	15	15.5
Height 12th spine. ....	4	8	-----	-----	-----	-----
Height membrane 12th spine. ....	3.5	5.5	-----	-----	-----	-----
Anal:						
Second spine. ....	9.5	12.5	8	9.5	19	17
Third spine. ....	9	11.5	10	10.7	13.5	15
Longest ray. ....	14	14.5	17.5	20	17	19
Caudal:						
Middle rays. ....	14	14.5	17	19.3	-----	-----
External rays. ....	21	19	23	22.5	-----	-----
Pectoral:						
Width base. ....	8	9	29	27	9	9.5
Length. ....	27	31	29	27	27	27.5
Ventral, length. ....	18	20	20.5	22.5	21.5	20

SANTA CRUZ, CAL., April 15, 1880.

## ON THE OCCURRENCE OF A SPECIES OF CREMNOBATES AT SAN DIEGO, CALIFORNIA.

By ROSA SMITH.

Three specimens of a small scaly Blenny found in those rocky tide-pools which are heavily lined with algae, on March 6, 1880.

This Blenny is evidently of rare occurrence, this one point being at present its only known habitat on the Pacific coast of the United States, and these three specimens the only ones I could procure. It is accompanied by *Oligocottus analis*, which in this vicinity is abundant in all rock-pools, by *Gibbonsia elegans* of a dull color, and by *Hypleurochilus gentilis*.

These specimens were provisionally identified as belonging to *Cremnobates monophthalmus* (Günther) Steindachner (*Ancheuopterus monophthalmus* Günther, Cat. Fishes Brit. Mus., iii, 275), a species hitherto known from three examples from the Pacific coast of Central America. My specimens differ from Günther's description in the following particulars: *The dorsal fin is continuous*, the membrane of the third spine joining the fourth near its summit in two examples, at its first third in the other. The head is proportionally shorter, forming two-ninths of the total length instead of one-fourth, and the body is less elongate, its depth forming one-fifth the total length instead of one-sixth. The characters of the San Diegan form of this genus agree more closely with Steindachner's description of *Cremnobates affinis* (Ichthyologische Beiträge, v, 178), a species considered by its describer as doubtfully distinct from *C. monophthalmus*. *C. affinis* is known from one individual taken on the West Indian island of St. Thomas, the proportions and coloration of which accord with my specimens, but this species also has the membrane from the third dorsal spine joining the fourth *at its base* ("die Membrane des dritten letzten Strahles setzt sich an die Basis des folgenden ersten Stachels des zweiten Dorsales an").

If the specimens from San Diego prove to be of a distinct species, which seems probable, they will be separated from those already known by the single merely emarginate dorsal fin, instead of two separate fins. In any event, the genus *Cremnobates* furnishes an interesting addition to the fauna of our Pacific coast.

***Cremnobates integripinnis* sp. nov.**

**DESCRIPTION.**—The body is oblong, compressed. The head is less than the fourth of the total length, which measures two inches and an eighth. Gape of mouth oblique, the maxillaries reaching a vertical line intersecting posterior rim of orbit. Head conical, thickish, with the orbits placed far forward, small fringed tentacles on their superior margins, a tentacle on posterior margin of anterior nostril, and palmate tentacles on occiput. A cusp or spine on opercle.

Dorsal continuous, composed wholly of spines of nearly equal height

throughout, the first and second spines a little higher than the third, which is rather higher than the fourth, the third and fourth somewhat separated, but connected by membrane nearly as high as that connecting fourth and fifth, the other spines gradually increasing in height backward. The three anterior spines less stiff than the others.

The two anal spines are connected by a membrane to the soft part of that fin, the anterior insertion of which is about midway between tip of snout and base of caudal. The caudal is posteriorly rounded, its interradial membrane being emarginate; the membrane of the last dorsal spine joins the base of the first ray of the caudal, while the latter is free from anal, the free tips of which extend beyond base of caudal.

Pectorals fan-like, their extremities reaching a vertical line intersecting vent. Branchiostegal membranes continuous under throat. Body covered with conspicuous cycloid scales, which are smaller on the belly. No scales on head or fins.

Lateral line of thirty-eight scales, beginning on the scapular region, running anteriorly very high, abruptly curving around pectorals, and pursuing a straight course on the median line of the side to the tail.

Teeth rather strong, conical, in a narrow band; a single series of rather strong teeth on vomer.

Color varies in three individuals: one is a dark brownish gray; another, of equal size (2½ inches long), is lighter; while a third, of 1½ inches in length, is lavender in color. The markings are similar on all my specimens, each being maculated and obscurely barred with a darker shade of its own color; the dorsal region is always darkest, and each individual has an ocellated spot, black, with narrow pale edging on posterior portion of dorsal fin. Dorsal and anal fins each with narrow pale edging. Pectoral fins reddish violet at base, with a black crescent around it, the rest of the fin pale, with dark cross-bars. Ventrals barred. Caudal with a dark bar at base, the rest of the fin translucent, with narrow dark bars formed of spots.

*Table of measurements.*

Length:		
Total, in inches .....	2.05	
To base of caudal, in inches.....	100 = 1.70	
Body, greatest depth .....		23
Head:		
Length .....		26
Diameter of eye.....		7.5
Length of maxillary.....		11
Dorsal fin:		
Total length .....		80
Distance from snout .....		21
Length of anterior part .....		9
Height of first spine.....		6
Height of second spine .....		7
Height of third spine.....		4
Height of fourth spine .....		3
Height of highest spine .....		7.5
Height of membrane connecting third and fourth spines.....		1.8

Anal fin, distance from snout .....	4.7
Caudal, length.....	18
Pectoral, length.....	24
Ventral, length .....	17
Fin rays:	
Dorsal .....	XXXII
Anal.....	II, 20
Scales in lateral line.....	38

The specimens have been presented to the United States National Museum.

SAN DIEGO, CAL., April 10, 1880.

**ON SOME NEW SPECIES OF EOCENE MOLLUSCA FROM THE SOUTHERN UNITED STATES.**

**By ANGELO HEILPRIN.**

A part of the species herein described have been for several past years among the collections of the United States National Museum. Those which are mentioned as coming from Texas were collected by Mr. G. W. Marnoch, who sent them some years ago to Dr. C. A. White, and were by the latter gentleman presented to the National Museum. The number following the description of each species is that by which it is recorded in the museum register.

**PLEUROTOMA, Lam.**

**PLEUROTOMA PAGODA, n. sp.**

Plate, fig. 1.

Ventricose; whorls about nine, the body-whorl nodulated on its most convex portion (nearly central), the nodulation consisting of a single series of sharp, obtusely-pointed, and flattened spines or nodes, which frequently appear double by the crossing of an impressed line over their basal portion; upper volutions with a similar series of nodes almost immediately above the sutural line, and gradually dwindling off into a crenulation; upper surface of the whorls concave, faintly striated, the sinuæ indicating but a faint sinus; lower surface with numerous well-developed revolving lines, which show a tendency to alternate. Aperture exceeding the spire in length, considerably contracted at about its center.

Length,  $1\frac{1}{2}$  inch. (No. 1505.)

Eocene of Alabama.

This species in its general appearance greatly resembles certain forms of *Fusus*, and a comparison of more numerous specimens may show it to belong to that genus, although the ornamentation of the whorls, as well as the sinuæ indication, more clearly point to *Pleurotoma*. The



only two specimens in the collection have the outer lip fractured, and I am therefore unable to pronounce conclusively upon the presence of a true notch.

*PLEUROTOMA VENUSTA*, n. sp.

Plate, fig. 2.

Slender, acuminate; whorls about nine, convex, ornamented by numerous fine revolving lines, which on the body-whorl are disposed in pairs; one deeply impressed line margins the majority of the volutions immediately below the suture; sinuated lines of growth not prominent; spire and aperture of about equal length.

Length,  $1\frac{1}{4}$  inch. (No. 1509.)

Jackson, Miss.

*PLEUROTOMA PLATYSOMA*, n. sp.

Plate, fig. 3.

Whorls ? in number, flattened, each volution following the other almost in direct continuation without any prominent sutural division, and ornamented with numerous revolving lines, which on the caudal portion of the body-whorl tend to alternate, a fine line interposing itself between the more prominent ones; aperture probably a little more than one-third the length of the entire shell; notch deep, sigmoidal.

Length, 2 inches ? (No. 8916.)

Atascosa County, Texas.

*EUCHEILODON*, Gabb.

*EUCHEILODON CRENO-CARINATA*, n. sp.

Plate, fig. 4.

Whorls subscalariform, flattened above, the angulation formed by a doubly crenulated carina; volutions ornamented by numerous revolving, profoundly elevated striæ, which are decussated by the much finer sinuated lines of growth; the upper or flattened portion with a prominent beaded line bordering the suture, and two (a finer and a coarser line) intermediate ones between the same and the carina; outer lip grooved within, and probably sharply crenulated by the terminations of the revolving striæ; columella with about eleven beads, which decrease in size from above downwards. Aperture nearly equal in length to the spire?

Length of fragment, 1 inch. (No. 8921.)

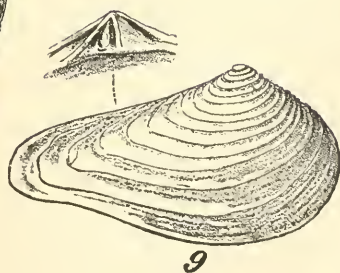
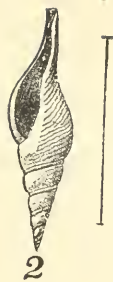
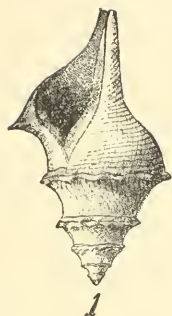
Jackson, Miss.

*SCALARIA*, Lam.

*SCALARIA UNILINEATA*, n. sp.

Plate, fig. 5.

Whorls about nine in number, convex, with numerous very faint, almost invisible, revolving lines, and much more prominent transverse





ones (about 24 on the body-whorl); two very distinct revolving lines on the last volution, the upper one placed at about the middle, the lower one subearinating it (only the upper of these two lines is seen on the remaining whorls, appearing there as a central line); base striated by revolving lines, and radially by the continuations of the transverse lines; aperture elliptical, somewhat produced distally.

Length,  $\frac{3}{4}$  inch. (No. 8920.)

Jackson, Miss.

### FUSUS, Lam.

Subgenus STREPSIDURA, Swainson.

#### FUSUS MARNOCHI, n. sp.

Plate, fig. 6.

Volutions seven or eight, the earlier three or four convex, the remainder flattened; body-whorl subangulate; suture impressed; aperture less than one-half the length of shell, the canal sharply twisted; columella with a pseudo-fold following the curve of the canal. The whorls in the single specimen before me are destitute of ornamentation, but some traces of the former existence of revolving lines are apparent.

Length,  $\frac{4}{5}$  inch. (No. 8917.)

Atascosa County, Texas.

Named after Mr. G. W. Marnoch, through whom this and other species of older Tertiary Texas fossils have been obtained.

### TEREBRA, Lam.

#### TEREBRA PLICIFERA, n. sp.

Plate, fig. 8.

Turreted; whorls? in number, flattened, rapidly decreasing in size from the base upwards, and ornamented by numerous broad and prominently defined plicæ, having a sigmoidal flexure; an impressed line on the upper portion of each volution produces a subsutural ring or band, over which the plicæ and corresponding sulci are continued, and which occasionally tends to become double from the presence of a second impressed line. Body-whorl with two elevated revolving lines on its basal angulation; base radiately and longitudinally striated; aperture? (broken in all specimens).

Length? (No. 8919.)

Atascosa County, Texas.

### CRASSATELLA, Lam.

#### CRASSATELLA DECLIVIS, n. sp.

Plate, fig. 9.

Very inequilateral, somewhat inflated anteriorly, the posterior dorsal margin descending very obliquely to the extremity, which is subcunei-

form; anterior margin descending rather abruptly, obtusely rounded; basal margin somewhat sinuous posteriorly. Surface deeply sulcated for the greater portion, the sulci mainly disappearing on the umbonial slope, where they give place to finely crowded striæ; apex acute; muscular impressions impressed; margin minutely crenulated.

Length,  $1\frac{3}{4}$  inches. (No. 2490.)

Aquia Creek, Virginia.

APRIL 25, 1880.

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**DESCRIPTION OF A NEW AGONOID FISH (BRACHYOPSIS XYOSTERNUS), FROM MONTEREY BAY, CALIFORNIA.**

**By DAVID S. JORDAN and CHARLES H. GILBERT.**

*Brachyopsis xyosternus* sp. nov.

Form of head and body as in *Brachyopsis verrucosus* Lockington. Body elongate, depressed, broadest at the shoulders, thence tapering rapidly to the snout, and gradually and evenly to the tail. Snout broad, obtuse, depressed, its sides parallel. Mouth terminal, very oblique, the lower jaw much the longer, its tip projecting upward above the upper profile of the snout. Mandible very broad, its greatest depth one-third its length, maxillary reaching to half way between front of orbit and pupil. A long barbel three-fourths the diameter of the orbit at its end. Premaxillaries anteriorly above the level of the pupil. Jaws with bands of villiform teeth. Vomer and palatines with slight asperities. Nasal spines present. No spines on top of cranium. Interorbital space broad, concave, from the elevation of the supraocular ridges. Preorbital with two spines. A sharp spine on the suborbital at lower posterior margin of eye. Preopercle with four processes, the upper one a sharp spine. Opercle striate, without spine. Top of head and the upper parts of the body without the small prickles which are found in *B. verrucosus*. Occipital pit obsolete.

No isthmus, the gill membrane united across the breast. No slit behind the last gill.

Body with the usual eight series of long keeled plates. Each keel terminating in a strong spine hooked backward, striæ radiating in every direction from the spine.

Dorsal series of plates 32, 6 before the spinous dorsal, 6 along its base, 4 between the two dorsals, 5 along the base of the soft dorsal, and 11 behind it. The two dorsal series uniting immediately behind the soft dorsal, the resultant single series round, with radiating striæ, the keel and spine obsolete. The two abdominal series similarly unite close behind the anal fin.

The plates in the upper lateral series diminish in size forward, becoming very small anteriorly. The lower lateral series becomes broader forwards as the other series decreases. It terminates abruptly opposite



the origin of the second dorsal. In the lower lateral series are 29 plates, in the abdominal series 30, 10 before the anal, 8 along its base, and 11 behind it.

Breast without distinct plates, but entirely covered with minute tubercles) each of which has a central spine. A series of five plates in front of the base of the pectorals, four of them armed with hooked spines.

Fin rays: D. VI-6; A. 8; V. I, 2.

Lowest rays of pectorals not so short as in *B. verrucosus*, the lowermost two-thirds the length of the longest (in *B. verrucosus* two-sevenths). Pectorals barely reaching front of anal.

Ventrals much shorter than in *B. verrucosus*, the tips reaching slightly more than half the distance to the anal fin (beyond front of anal in *B. verrucosus*). Inner ray of ventrals very little longer than the outer, the connecting membrane narrow (very broad in *verrucosus*). Vent but little behind ventrals.

Coloration.—Upper parts dusky; mandible, cheek, and suboperele silvery. Belly pale, with reddish tint. Lower half of pectoral reddish at base, the rest of the fin thickly dusted with black points. Ventrals reddish. Dorsal membrane immaculate, the rays punctulate with black. Caudal blackish. Anal reddish anteriorly, dusky behind.

This species is related to *Brachyopsis verrucosus*, lately described by Mr. Lockington, differing, however, in several important respects, especially (*a*) in the presence of small prickles on the breast instead of the large wart-like plates characteristic of *verrucosus*, (*b*) in the short ventral fins, (*c*) the absence of small prickles on the plates of the body, (*d*), the smaller number of plates, (*e*) the shorter vertical fins, (*f*) the long maxillary barbel, and (*g*) the deep mandible.

*Brachyopsis verrucosus* is comparatively common in the open water between Point Reyes and the Farallones, and is frequently brought in in the trawl-nets. *Brachyopsis xyosternus* is thus far known only from a specimen found on the beach at Santa Cruz by Dr. C. L. Anderson, and presented by him to the United States National Museum.

The genus to which these two species belong is well separated from *Agonus* by the absence of an isthmus, as well as by the entirely different form of the mouth and anterior portion of the head. Whether they are congeneric with the type of *Brachyopsis* Gill (*Agonus rostratus* Tilesius, from Kamtschatka) is yet to be proven.

Table of measurements.

	<i>Xyosternus</i> , Santa Cruz.	<i>Verrucosus</i> , Punta Reyes.
Extreme length, in inches .....	5.20	6.45
Length to base of caudal = 100 .....	4.40	5.55
Body, greatest depth .....	11 (ca)	12
Head:		
Length .....	22	24
Distance from snout to nape .....	17.5	19.5
Greatest width .....	15	16.5
Interorbital width .....	4	5
Length of snout .....	4.2	6

Table of measurements—Continued.

	<i>Xyosternus</i> , Santa Cruz.	<i>Verrucosus</i> , Punta Reyes.
Head:		
Length of maxillary.....	6.5	7.5
Length of mandible.....	11	12
Depth of mandible.....	3.6	2.5
Diameter of orbit.....	5	6
Length of maxillary barbel.....	3.5	1
Dorsal (spinous):		
Distance from snout.....	31	25.5
Greatest height.....		
Length of base { to end of membrane.....	17	11
{ to last spine.....	11	19
Dorsal (soft):		
Length of base { to end of membrane.....	16	
{ to last ray.....	10	13.5
Height of longest ray.....	13	12
Anal:		
Distance from snout.....	47.5	52
Length of base { to end of membrane.....	22	
{ to last ray.....	16.5	24
Height of longest ray.....	13	10
Caudal, length.....	19.5	16.5
Pectoral, length.....	24	24.5
Ventral:		
Distance from snout.....	24	28
Length.....	14.5	29.5
Dorsal rays.....	VI-6	IX-7
Anal rays.....	8	11
Pectoral rays.....	17	14
Ventral rays.....	1, 2	1, 2
Number of tubes in lateral line.....	34	37
Number of plates in dorsal series.....	32	35
Number of plates in lower lateral series.....	29	35

SANTA CRUZ, CAL., April 20, 1880.

**DESCRIPTION OF A NEW FLOUNDER (*HIPPOGLOSSOIDES EXILIS*),  
FROM THE COAST OF CALIFORNIA.**

**By DAVID S. JORDAN and CHARLES H. GILBERT.**

***Hippoglossoides exilis* sp. nov.**

Eyes and color on the right side. Body elongate, comparatively slender, rather closely compressed; the dorsal outline more curved than the ventral, and neither strongly arched; the body tapering backwards into a slender caudal peduncle, which is considerably longer than deep. Greatest depth about one-third the length to base of caudle.

Head moderate, not obtuse, the outline of the snout continuous with the descending profile of the back. Mouth not large, very oblique, the upper jaw with its margin on each side concave, the lower jaw correspondingly convex. Lower jaw slightly protruding, with a distinct symphyseal knob. Maxillary rather narrow, its posterior end obliquely truncate, not extending quite to opposite the middle of the pupil. Pre-maxillary anteriorly on the level of the interorbital space.

Teeth all conical, the upper jaw with two distinct series; outer series of teeth smaller than in the other species of *Hippoglossoides*, not large anteriorly, and becoming quite small posteriorly. Teeth of the inner series quite small, closely and evenly set. Lower jaw with a single

series of close-set teeth, much smaller than in the outer series of the upper jaw.

Eyes large, the lower somewhat in advance of the upper, their diameter two-sevenths of the length of the head. The upper eye with some vertical range, but not encroaching on the dorsal line.

Interorbital space a very narrow sharp ridge, with three rows of small scales, a slight ridge connecting it with the lateral line. A series of mucous pores around lower eye behind. About 8 scales in a series obliquely across the cheeks.

Gill-rakers rather slender, shorter than in the other species of this genus, but similar in form, compressed, toothed on the inner edge, somewhat curved forwards. About 10 of them below the angle of the arch, the longest not one-third the diameter of the eye.

Scales comparatively large, very much larger than in the other species of *Hippoglossoides*, thin, almost membranaceous, and somewhat readily deciduous, their edges conspicuously ctenoid, but much less rough than in *H. jordani*. In the latter species the scales are of much firmer texture, and their cilia are spine-like and stiff. The character of the scales is similar to that of *Atheresthes stomias*, which this species also simulates in form and color. Scales on the head entirely similar to those on the body, but somewhat smaller. Those on left side also similar, but less strongly ctenoid. They are, however, considerably rougher than on the blind side in related species.

Lateral line very prominent, its tubes coarse. It is straight behind, slightly and regularly rising anteriorly, without trace of arch or convexity.

Rays of both dorsal and anal fins extensively scaly on both sides. Scales extending high up on all the fins. Scales 16-71-18 (42-125-43 in *Hippoglossoides jordani*).

Fins low, rather fragile, the rays set well apart.

Dorsal fin beginning immediately in front of the pupil, its anterior rays very low, the highest rays much behind the middle of the fin, their height much less than the length of the caudal peduncle, and but little more than the diameter of the eye.

Anal fin similar to the dorsal, but rather higher, preceded by a spine which is shorter than in *H. jordani*.

Caudal fin long, somewhat pointed, the middle rays unusually produced.

Pectoral fins small, little more than half the length of the head, that of the left side less than a third. Ventral fins both lateral, small, not reaching to the anal spine.

Fin rays: D. 78; A. 62; V. 6.

Color pale olivaceous brown, rendered darker by black punctulations, which form an edging around each scale, sometimes with a few very faint bronze spots. Fins somewhat dusky, especially the caudal and

pectoral; dorsal and anal edged with yellowish anteriorly; ventrals with considerable light yellow.

This species is known to us from upwards of a hundred specimens taken in sweep-nets between the Golden Gate and Point Reyes.

All the specimens are small, ranging from 8 to 12 inches in length. Its abundance, in the San Francisco market at least, seems to be confined to the month of April.

Its relations are not intimate with the two species of this genus previously known—*H. platessoides* of the North Atlantic and *H. jordani* of the North Pacific. From both it differs in the elongate form, much larger scales, fewer fin rays, smaller teeth, &c. With *H. jordani*, which inhabits the same waters, it agrees in scarcely any respect, excepting in the characters of the genus *Hippoglossoides*, i. e., the large mouth, conical teeth, ctenoid scales, simple, straight, lateral line, convex caudal, dextral eyes, &c.

Table of measurements.

	<i>Exilis.</i>	<i>Jordani.</i>
Extreme length, in inches .....	10.25	9.08
Length to base of caudal, in inches=100 .....	8.40	7.70
Body:		
Greatest height .....	33	41
Least height .....	8.2	9.8
Length of caudal peduncle .....	12.5	8
Head:		
Greatest length .....	25.5	28.5
Width of interorbital area .....	.50	1.50
Length of snout .....	3.7	3.8
Length of orbit .....	9.3	9
Length of maxillary .....	9	11
Length of mandible .....	11.5	14
Length of longest gill-raker .....	2	3
Dorsal:		
Distance from snout .....	9.3	9
Greatest height .....	8	11.5
Anal:		
Distance from snout .....	35	33
Height at longest ray .....	9.5	10.5
Caudal:		
Length of middle rays .....	20.5	17.5
Length of outer rays .....	17	17
Pectoral:		
Right side, length .....	14	15.5
Left side, length .....	8	11
Ventral, right side, length .....	7.5	8
Dorsal rays .....	78	94
Anal rays .....	62	73
Scales in lateral line .....	71	125
Scales in transverse row above lateral line .....	16	42
Scales in transverse row below lateral line .....	18	43

SAN FRANCISCO, CAL., April 21, 1880.



**DESCRIPTIONS OF NEW INVERTEBRATE FOSSILS FROM THE  
MESOZOIC AND CENOZOIC ROCKS OF ARKANSAS, WYOMING, COL-  
ORADO, AND UTAH.**

**By C. A. WHITE.**

The fossils described in the following paragraphs are among the collections of the National Museum. All except one species have been selected for description from among the collections that were made under the auspices of the surveys formerly in charge, respectively, of Professor Powell, Dr. Hayden, and Captain Wheeler. Two of them, *Callianassa ulrichi* and *Spirorbis dickhauti*, are embraced in a small Collection of Cretaceous fossils sent to the National Museum from near Little Rock, Ark., by Mr. E. O. Ulrich, of Cincinnati, Ohio.

## MOLLUSCA.

### CONCHIFERA.

Genus PTERIA Scopoli.

Subgenus OXYTOMA Meek.

PTERIA (OXYTOMA) ERECTA (sp. nov.).

*Aricula linguiformis* White, 1876 (not Shumard), Powell's Rep. Geol. Uinta Mts., p. 95.

Shell rather small, appearing to be nearly erect, but the axis is slightly oblique to the hinge-line; both valves convex, but the right one less convex than the left; hinge-line long, much longer than the axial length of the shell; posterior wing large, its extremity acutely angular and moderately prominent; anterior wing comparatively large, prominent, obtusely pointed, defined from the body of the shell by a sinus or furrow in both valves, the direction of which forms a slightly obtuse or nearly right angle with the hinge-line; front, exclusive of the anterior wing, nearly perpendicular the margin forming a nearly regular curve from the front all the way around to the posterior side, where it is flexed with a backward curve to meet the extremity of the hinge-line; umbones somewhat prominent, especially that of the left valve. Surface having a nearly smooth appearance, but the lens reveals the presence of somewhat regularly disposed concentric lines.

Length of hinge-line, 32 millimeters; axial length of the shell, 26 millimeters. (Museum No. 8771.)

This shell was formerly referred by me (*loc. cit.*) to the *Aricula linguiformis* of Shumard, but it differs from that species by having larger wings, a much longer hinge-line, and a much less oblique axis. It may be compared with *P. (O.) salinensis* White, Proc. U. S. Nat. Mus., vol. ii, p. 296, pl. 5, figs. 1 and 2; but it differs in being less robust, having



proportionally larger wings, narrower body, and a more nearly erect axis.

*Position and locality.*—Lower Potato Valley, Southern Utah, where it was obtained by Prof. J. W. Powell from Cretaceous strata.

## Genus SOLEMYA Lamarek.

### SOLEMYA BILIX (sp. nov.).

Shell about two and a half times as long as high, broader anteriorly than posteriorly; both ends rounded, the posterior one more narrowly so than the other; both dorsal and basal margins gently convex or nearly straight; test thin and fragile; valves moderately convex from above downward, the greatest convexity in that direction being near the dorsum; beaks, having the usual inconspicuous character common to the genus, situated near the posterior end; ligament necessarily short, but apparently well developed, and resting upon a fulcrum of support of the usual character in each valve. Surface bright and, besides the usual lines of growth, marked by numerous faint radiating lines, which are visible to the unassisted eye, but are satisfactorily seen only under a lens, nearly uniformly distributed over the whole surface, but upon the middle portion they are arranged in pairs.

Length, 20 millimeters; height at the broadest part, which is in front of the middle, 8 millimetres. (Museum No. 8913.)

This is plainly a characteristic species of *Solemya*, but the only fossil species with which it need be compared is *S. subplicata* Meek & Hayden, from the Fox Hills Cretaceous of the Upper Missouri. It differs from that species in being proportionally broader in front, in the character and uniformity of distribution of its radiating striae, and in wanting the subpliate character of the front portion. The extension of the epidermis has not been observed, but in other respects this species may be compared with the living *S. velum* Say in general form, and in the pairing of its radiating lines.

*Position and locality.*—Cretaceous strata, associated with *Maestra holmesii* (= *Cyrcna? holmesii* Meek), about four miles north of Golden, Colo., where it was obtained by Mr. W. H. Holmes. These strata were formerly supposed to belong to the Lignite series (Laramie), but they are marine Cretaceous, as I have shown in An. Rep. U. S. Geol. Sur. Terr. for 1877, pp. 193–196.

## Genus LUCINA Bruguière.

### LUCINA PROFUNDA (sp. nov.).

Shell subcircular or subpentahedral; valves not very convex; posterior side truncate, narrower than the anterior; basal border having its margin more abruptly convex at its middle than towards the front and rear; dorsal margin short, nearly straight; front margin having a nearly

regular curve; beaks small, submedially located, distinct but inconspicuous; umbonal ridge slightly developed, curved, passing near the dorsal and posterior borders. Surface marked by the usual concentric lines of growth.

Length, 20 millimeters; height, from base to beaks, 18 millimeters. (Museum No. 8362.)

This species is readily recognizable by its comparatively narrow posterior side, its deeply convex basal border, and slight convexity of the valves.

*Position and locality.*—Cretaceous strata, Monument Creek, Colorado, where it was obtained by Dr. A. C. Peale.

## GASTEROPODA.

### Genus PLANORBIS Guettard.

#### PLANORBIS ÆQUALIS (sp. nov.).

Shell rather small, coiled nearly in a plane, apparently sinistral; whorls apparently 4 or 5, in close contact but only slightly involute, broadly convex upon the periphery, but their sides more narrowly convex, their transverse diameter greater than that which corresponds with the plane of the coil.

Surface marked by a considerable number of revolving raised lines or slight angulations, which are crossed by the usual lines of growth.

Diameter of the full coil of the largest example discovered, 6 millimeters. (Museum No. 8909.)

This is apparently the only species of typical biumbilicate *Planorbis* that has yet been discovered among the fossil fresh-water faunæ of the Western region, and it therefore needs no detailed comparison.

*Position and locality.*—Green River Group, Eocene, Henry's Fork of Green River, Southern Wyoming.

#### Subgenus GYRAULUS Agassiz.

#### PLANORBIS (GYRAULUS) MILITARIS (sp. nov.).

Shell very small, dextral, depressed-convex above, umbilicate below; volutions two and a half to three and a half, convex on all sides except the inner, which is very narrowly flattened against each preceding coil; suture deeply impressed both above and below; surface marked by comparatively coarse lines of growth.

Diameter of the full coil of the larger examples in the collection, 4 millimeters. (Museum No. 8594.)

This form was noticed but not named by me in vol. iv, U. S. Expl. & Sur. West of the 100th Merid., p. 210. At that time I was not satisfied as to the mature condition of these shells, but by careful examina-

tion of a larger number of examples there seems to be no reason for doubt upon that point.

The subgenus *Gyraulus* has not heretofore been published as occurring among our large fossil pulmonate molluscan faunæ of the West, but at least two other species probably exist there, one in the Bear River (Laramie) strata, and the other in those of the Green River Group.

*Position and locality.*—Head of Soldiers' Fork, Utah, where they were obtained by one of the parties of the survey in charge of Lieutenant Wheeler. The true age of the strata is not at present definitely known, but it is understood to be either that of the upper portion of the Laramie or the lower portion of the Wahsatch Group.

## Genus LIMNÆA Lamarek.

### Subgenus LEPTOLIMNEA Swainson.

#### LIMNÆA (LEPTOLIMNEA) MINUSCULA (sp. nov.).

Shell rather small, moderately attenuate; spire much longer than the aperture; volutions six or seven, moderately convex, the distal border very narrowly appressed against each preceding coil; aperture small, elongate, subovate; columellar fold distinct, but not large. Surface marked by distinct lines of growth, but no revolving lines have been detected.

The only two examples of this species that have been discovered are broken, but the full length of the larger one is estimated at 9 millimeters; diameter of last volution, 3 millimeters; length of aperture, 3½ millimeters. (Museum No. 8907.)

*Position and locality.*—From strata belonging to either the basal portion of the Green River Group or the upper portion of the Wahsatch Group, about three miles east of Table Rock Railroad station, Southern Wyoming, where it is associated with *Planorbis cirratus* White, and also a small Limnæid that is probably referable to *Acella* Haldeman.

## Genus HELIX Linnæus.

### Subgenus PATULA Haldeman.

#### HELIX (PATULA) SEPULTA (sp. nov.).

Shell convex above; umbilicus moderately wide; volutions about six, convex upon all sides except the inner; suture impressed; surface regularly but minutely ribbed, the ribs having the same direction as the lines of growth.

All the examples discovered are distorted by pressure, but the diameter of the full coil of the largest example was about 12 millimeters and its full height about 7 millimeters. (Museum No. 8908.)

*Position and locality.*—The coal-bearing series of strata at Evanston, Wyo., where it is associated with *H. evanstonensis* White and other forms. These strata belong either to the upper part of the Laramie or the lower portion of the Wahsatch Group.

## ARTICULATA.

## VERMES.

Genus SPIRORBIS Lamarck.

SPIRORBIS? DICKHAUTI (sp. nov.).

Shell discoid, one side being nearly flat and the other broadly umbilicate; volutions about five, partially embracing but all of them visible, somewhat rugose but increasing in size with considerable regularity; peripheral side of the volutions flattened or gently convex, having a single revolving raised line along its middle and another similar one at each border, where it sharpens the angularity between the lateral and peripheral sides; outer portion of both the lateral sides of the volutions concave, and the inner portion convex, giving the last-named portion a greater transverse diameter than the outer portion, the larger part of which is embraced by the next succeeding volution; aperture small, round, and apparently, but not really, contracted. The cavity being round, the outer portion of the test only partakes of the irregularity described, and seems to have been deposited as an encrustation upon the first-formed inner portion, that of adjacent volutions seeming to blend, obscuring the suture. Besides a considerable degree of rugosity, the surface shows under the lens a peculiar granular or rather an etched appearance.

Greatest diameter of the full coil of the largest example discovered, 9 millimeters; greatest diameter of the outer volution, near the aperture,  $2\frac{1}{2}$  millimeters. (Museum No. 9073.)

In size and general aspect this species resembles *S. rotulus* Morton sp., from the Cretaceous of New Jersey, but although doubtless congeneric, it differs from that species in the character of its surface ornamentation, and in having a round instead of quadrangular aperture. This shell is referred to the shell-bearing worms and not to the mollusca on account of the peculiar character of the test. It probably does not strictly belong to the genus *Spirorbis*, but it is regarded as at least a closely related form.

*Position and locality.*—Cretaceous strata near Little Rock, Ark., where it was obtained by Mr. E. O. Ulrich, and also by Mr. H. E. Dickhaut, in whose honor the specific name is given.

## CRUSTACEA.

Genus CALLIANASSA Leach.

CALLIANASSA ULRICHI (sp. nov.).

Hand quadrate, flattened; inner face less convex than the outer; both upper and lower edges acute, the lower one more so than the upper, and finely crenulate; fixed finger slender, plain, its transverse section sub-

triangular, gently curved, shorter than the hand; movable finger larger and stronger than the fixed one, having a moderately strong prominent ridge upon the inner side, between the front end of which and the extremity of the finger there is sometimes a distinct tooth. Surface nearly smooth, but some examples are granulate about the middle of both sides of the hand, and several small foramina are observable along the upper margin of the movable finger.

Length of hand, 13 millimeters; breadth, 10 millimeters; thickness, 4 millimeters. (Museum No. 8910.)

*Position and locality.*—This species has been sent to the United States National Museum by Mr. E. O. Ulrich, in whose honor the specific name is given. He obtained it from Cretaceous strata near Little Rock, Ark. Associated with it, besides certain characteristic Cretaceous mollusca, there are several separate movable fingers which plainly belong to another decapod crustacean; but although complete in themselves, they constitute too small a portion of the animal to satisfactorily base a specific description upon them.



## A CATALOGUE OF THE BIRDS OF NORTH AMERICA.

By **ROBERT RIDGWAY.**

## INTRODUCTION.

During the interval of twenty-one years which has elapsed since the publication of the last Smithsonian catalogue,\* a great advance has naturally been made in our knowledge of North American ornithology; and so numerous and important are the changes which have resulted, through additions of new species, rectifications of synonymy, etc., that a new list seems desirable to take the place of the old one.

The total apparent number of species given in the old catalogue has been increased only from 738 to 764, a slight numerical discrepancy which it is necessary to explain. From the catalogue of 1859 there have been eliminated no less than 62 names, which are either not entitled to a place in the North American fauna or which have been degraded to varietal or sub-specific rank, the number of the species in the latter case being here simply duplicated as many times as there are varieties of a species. To offset this large reduction, 59 valid new species have been described since 1859, and 77 added, or restored, to the fauna, the accessions thus numbering 127 species, or 65 more than the eliminations. The forms considered to be of merely subspecific rank number 160, which, added to the 764 valid species recognized, gives a total of 924 definable forms composing the North American avian fauna, as now understood.†

It is found impracticable to here distinguish, in all cases, between

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\* Two catalogues of North American birds have been issued by the Smithsonian Institution, as follows:

(1) Catalogue of North American Birds, chiefly in the Museum of the Smithsonian Institution. By Spencer F. Baird, Assistant Secretary of the Smithsonian Institution. Washington: Smithsonian Institution. October, 1858. 4to, paper. 1 p. l., pp. xvii-lvi. [Reissue, with new title-page, of pp. xvii-lvi of Vol. IX, Pacific R. R. Reports ("Birds of North America"). Includes, besides the list of 738 species, with habitats, tables of the higher groups, and lists of extralimital species (23 in number) treated in the general report, and of others (31) claimed, on apparently insufficient grounds, as North American; also a summary of the number of species given in the works of Wilson, Bonaparte, and Audubon.]

(2) Catalogue of North American Birds, chiefly in the Museum of the Smithsonian Institution. By Spencer F. Baird. First octavo edition. Washington: Smithsonian Institution. [Smithsonian Miscellaneous Collections, No. 108.] 1859. 8vo. 2 p. ll., pp. 19+2. [Essentially the same as the quarto list, but without habitats, and the matter relating to classification, etc. The two additional pages are an alphabetical index of the North American genera. As in the quarto list, there are, ostensibly, 738 species, but 22 numbers are duplicated, making a total of 760 names in the list.]

† A full analysis of the changes made in this catalogue is given on pages 213-234.

species which are truly or peculiarly North American and those which are more properly visitants from other countries; but in the case of those whose occurrence appears to be accidental or occasional, the number preceding the name is inclosed in brackets. Of the latter class, species which there is good reason to believe did not reach our limits through natural means (*i. e.*, those escaped from confinement) have been, in every case, carefully excluded, as have likewise *all* introduced species.

It has been deemed best, in view of the recent discoveries along our southwestern border, to retain as North American all the species (less than a dozen in number) treated by Professor Baird in Volume IX, Pacific Railroad Reports ("Birds of North America"), and likewise given in the old catalogue, on account of their having been obtained just across the boundary, in Northern Mexico; their discovery within our limits being quite certainly only a question of time and investigation. For the same reason, the remaining few of Giraud's "Sixteen New Species of Texan Birds"\* are also included. Neither are we prepared to relinquish several Audubonian species which at the present time are known only from the descriptions and figures by their discoverer (*e. g.*, *Regulus curieri*, *Perissoglossa* [?] *carbonata*, *Dendroica montana*, and *Wilsonia minuta*, as well as other better-known species which are given by Audubon on his own authority (*e. g.*, *Chrysomitris* "*magellanica*" = *C. notata*, and *Endocimus ruber*).

Several species peculiar to the islands of Socorro and Guadalupe, off the coast of northwestern Mexico and Lower California, respectively, together with the few forms peculiar to the latter peninsula, are regarded as truly North American, their affinities, with perhaps only two exceptions (*i. e.*, *Conurus holochlorus* and *Polyborus lutosus*), being strictly "Nearctic."

The greatest difficulty encountered in the compilation of this work has been in the way of distinguishing between valid "species" and those forms to be regarded as geographical races of merely subspecific rank. The greatest care has been taken in all doubtful cases of this kind, and previous conclusions (published in "History of North American Birds"† and elsewhere) carefully reconsidered, with the aid of all the material accessible, including many specimens not previously in hand. This reconsideration of the subject has, in not a few cases, resulted in a reversal of former opinion, specimens from important localities not before represented often deciding the point one way or the other. Every form whose characteristics bear unmistakably the impress of climatic or

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\* A Description of Sixteen New Species of North American Birds, by Jacob P. Giraud, jr. New York. George F. Nesbitt, printer, Tontine Building, corner of Wall and Water streets. 1841. Folio, not paged, 8 plates. [For species given in this work, which have not since been obtained within the limits of the United States, see p. 229.]

† A History of North American Birds, by S. F. Baird, T. M. Brewer, and R. Ridgway. Land Brds. Illustrated by 64 colored plates and 593 woodcuts. 3 vols., royal 4to. Boston. Little, Brown, & Co.

local influences, gradually less marked toward the habitat of another form, with which it thus intergrades; and all forms which certainly intergrade, no matter how widely distinct the opposite extremes may appear (*e. g.*, *Colaptes auratus* and *mexicanus*), together with intergrading forms whose peculiarities are not explained by any known "law" of variation, have been reduced to subspecific rank. On the other hand, where the difference between allied forms is slight, but at the same time absolutely constant, and not coincident with a difference of habitat (*e. g.*, certain of the small Thrushes and the various forms of *Junco*), specific rank is upheld. There are some forms which future investigation, based upon adequate material, may decide to be of different rank from that accorded them here. We cheerfully acknowledge our fallibility, but at the same time would say that we have endeavored to be as conscientious and consistent as possible, giving the rank of each form as it appears in the light of our present knowledge, independent of previous conclusions.

SMITHSONIAN INSTITUTION, *January 22, 1880.*

# CATALOGUE.

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107. *DENDRÆCA VIRENS* (GMEL.) BAIRD.  
Black-throated Green Warbler. [189.]
108. *DENDRÆCA TOWNSENDI* (NUTT.) BAIRD.  
Townsend's Warbler. [191.]



109. **DENDRÆCA OCCIDENTALIS** (TOWNS.) BAIRD.  
Hermit Warbler. [190.]
110. **DENDRÆCA KIRTLANDI** BAIRD.  
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111. **DENDRÆCA PINUS** (WILS.) BAIRD.  
Pine-creeping Warbler. [198.]
112. **DENDRÆCA MONTANA** (WILS.) BAIRD.  
Blue Mountain Warbler. [199.]
113. **DENDRÆCA PALMARUM** (GMEL.) BAIRD.  
Red-poll Warbler. [208.]
- 113a. **DENDRÆCA PALMARUM HYPOCHRYSEA** RIDGW.  
Yellow Red-poll Warbler.
114. **DENDRÆCA DISCOLOR** (VIEILL.) BAIRD.  
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115. **SIURUS AURICAPILLUS** (LINN.) SWAINS.  
Golden-crowned Thrush. [186.]
116. **SIURUS NÆVIUS** (BODD.) COUES.  
Small-billed Water Thrush. [187.]
- 116a. **SIURUS NÆVIUS NOTABILIS** GRINNELL.  
Grinnell's Water Thrush.
117. **SIURUS MOTACILLA** (VIEILL.) COUES.  
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118. **OPORORNIS AGILIS** (WILS.) BAIRD.  
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119. **OPORORNIS FORMOSA** (WILS.) BAIRD.  
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120. **GEOTHLYPIS PHILADELPHIA** (WILS.) BAIRD.  
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121. **GEOTHLYPIS MACGILLIVRAYI** (AUD.) BAIRD.  
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122. **GEOTHLYPIS TRICHAS** (LINN.) CABAN.  
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123. **ICTERIA VIRENS** (LINN.) BAIRD.  
Yellow-breasted Chat. [176.]
- 123a. **ICTERIA VIRENS LONGICAUDA** (LAWR.) COUES.  
Long-tailed Chat. [177.]
124. **WILSONIA MITRATA** (GMEL.) BP.  
Hooded Warbler. [211.]
125. **WILSONIA PUSILLA** (WILS.) BP.  
Black-capped Yellow Warbler. [213.]

- 125 a. **WILSONIA PUSILLA PILEOLATA** (PALL.) RIDGW.  
Pileolated Warbler.
126. **WILSONIA MINUTA** (WILS.) RIDGW.  
Small-headed Flycatcher. [212.]
127. **WILSONIA CANADENSIS** (LINN.) COUES.  
Canadian Flycatching Warbler. [214, 215.]
128. **SETOPHAGA RUTICILLA** (LINN.) SWAINS.  
American Redstart. [217.]
129. **SETOPHAGA PICTA** SWAINS.  
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130. **SETOPHAGA MINIATA** SWAINS.  
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131. **CARDELLINA RUBRIFRONS** (GIRAUD) SCL.  
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132. **ERGATICUS RUBER** (SWAINS.) BAIRD.  
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133. **BASILEUTERUS CULICIVORUS** (LICHT.) BONAP.  
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134. **BASILEUTERUS BELLII** (GIRAUD) SCL.  
Bell's Warbler.
135. **VIREOSYLVA OLIVACEA** (LINN.) BONAP.  
Red-eyed Vireo. [240.]
136. **VIREOSYLVA AGILIS FLAVO-VIRIDIS** (CASS.) RIDGW.  
Yellow-green Vireo. [241.]
137. **VIREOSYLVA CARIDRIS BARBATULA** (CABAN.) RIDGW.  
Black-whiskered Vireo. [243.]
138. **VIREOSYLVA PHILADELPHICA** CASS.  
Philadelphia Vireo. [244.]
139. **VIREOSYLVA GILVA** (VIEILL.) CASS.  
Warbling Vireo. [245.]
- 139 a. **VIREOSYLVA GILVA SWAINSONI** BAIRD.  
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140. **LANIVIREO FLAVIFRONS** (VIEILL.) BAIRD.  
Yellow-throated Vireo. [252.]
141. **LANIVIREO SOLITARIUS** (VIEILL.) BAIRD.  
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- 141 a. **LANIVIREO SOLITARIUS CASSINI** (XANTUS) RIDGW.  
Cassin's Vireo. [251.]
- 141 b. **LANIVIREO SOLITARIUS PLUMBEUS** (COUES) ALL.  
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142. **VIREO ATRICAPILLUS** WOODH.  
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143. **VIREO NOVEBORACENSIS** (GMEL.) BP.  
White-eyed Vireo. [248.]
144. **VIREO HUTTONI** CASS.  
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145. **VIREO BELLII** AUD.  
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146. **VIREO PUSILLUS** COUES.  
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147. **VIREO VICINIOR** COUES.  
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148. **LANIUS BOREALIS** VIEILL.  
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149. **LANIUS LUDOVICIANUS** LINN.  
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- 149 a. **LANIUS LUDOVICIANUS EXCUBITORIDES** (SW.) COUES.  
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- 149 b. **LANIUS LUDOVICIANUS ROBUSTUS** BAIRD.  
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150. **AMPELIS GARRULUS** LINN.  
Northern Wax-wing. [232.]
151. **AMPELIS CEDRORUM** (VIEILL.) BAIRD.  
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152. **PROGNE SUBIS** (LINN.) BAIRD.  
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- 152 a. **PROGNE SUBIS CRYPTOLEUCA** BAIRD.  
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153. **PETROCHELIDON LUNIFRONS** (SAY) LAWR.  
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154. **HIRUNDO ERYTHROGASTRA** BODD.  
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155. **TACHYCNETA BICOLOR** (VIEILL.) CABAN.  
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156. **TACHYCNETA THALASSINA** (SWAINS.) CABAN.  
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157. **COTILE RIPARIA** (LINN.) BOIE.  
Bank Swallow. [229.]
158. **STELGIDOPTERYX SERRIPENNIS** (AUD.) BAIRD.  
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159. *CERTHIOLA BAHAMENSIS* REICHENB.  
Bahaman Honey Creeper. [301.]
160. *EUPHONIA ELEGANTISSIMA* (BP.) GRAY.  
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161. *PYRANGA RUBRA* (LINN.) VIEILL.  
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162. *PYRANGA LUDOVICIANA* (WILS.) BP.  
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163. *PYRANGA HEPATICA* SWAINS.  
Hepatic Tanager. [222.]
164. *PYRANGA ZESTIVA* (LINN.) VIEILL.  
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- 164a. *PYRANGA ZESTIVA COOPERI* RIDGW.  
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165. *HESPERIPHONA VESPERTINA* (COOPER) BP.  
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- [167.] *PYRRHULA CASSINI* BAIRD.  
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168. *CARPODACUS PURPUREUS* (GM.) BAIRD.  
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- 168a. *CARPODACUS PURPUREUS CALIFORNICUS* BAIRD.  
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169. *CARPODACUS CASSINI* BAIRD.  
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170. *CARPODACUS FRONTALIS* (SAY) GRAY.  
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- 170a. *CARPODACUS FRONTALIS RHODOCOLPUS* (CABAN.) RIDGW.  
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171. *CARPODACUS AMPLUS* RIDGW.  
Guadalupe House Finch.
172. *LOXIA CURVIROSTRA AMERICANA* (WILS.) COUES.  
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- 172a. *LOXIA CURVIROSTRA MEXICANA* (STRICKL.) BAIRD.  
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173. *LOXIA LEUCOPTERA* GM.  
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174. *LEUCOSTICTE GRISEINUCHA* (BRANDT) BAIRD.  
Aleutian Rosy Finch. [323.]

175. **LEUCOSTICTE TEPHROCOTIS** SWAINS.  
Gray-crowned Rosy Finch. [322.]
- 175a. **LEUCOSTICTE TEPHROCOTIS LITTORALIS** (BAIRD) COUES.  
Gray-headed Rosy Finch.
176. **LEUCOSTICTE ATRATA** RIDGW.  
Black Rosy Finch.
177. **LEUCOSTICTE AUSTRALIS** ALLEN.  
Brown-capped Rosy Finch.
178. **ÆGIOTHUS CANESCENS** GOULD.  
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- 178a. **ÆGIOTHUS CANESCENS EXILIPES** (COUES) RIDGW.  
White-rumped Redpoll.
179. **ÆGIOTHUS LINARIA** (LINN.) CABAN.  
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- 179a. **ÆGIOTHUS LINARIA HOLBOLLI** (BREHM) RIDGW.  
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180. **ÆGIOTHUS BREWSTERI** RIDGW.  
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181. **ASTRAGALINUS TRISTIS** (LINN.) CAB.  
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182. **ASTRAGALINUS PSALTRIA** (SAY) COUES.  
Green-backed Goldfinch. [314.]
- 182a. **ASTRAGALINUS PSALTRIA ARIZONÆ**, COUES.  
Arizona Goldfinch. [315.]
- 182b. **ASTRAGALINUS PSALTRIA MEXICANUS** (SW.) COUES.  
Mexican Goldfinch.
183. **ASTRAGALINUS LAWRENCEII** (CASS.) BP.  
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184. **CHRY SOMITRIS NOTATA** (DU BUS) BP.  
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185. **CHRY SOMITRIS PINUS** (WILS.) BP.  
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186. **PLECTROPHANES NIVALIS** (LINN.) MEYER.  
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188. **CENTROPHANES PICTUS** (SWAINS.) CABAN.  
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- 193 a. **PASSERCULUS SANDWICHENSIS SAVANNA** (WILS.) RIDGW.  
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- 193 b. **PASSERCULUS SANDWICHENSIS ALAUDINUS** (BP.) RIDGW.  
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195. **PASSERCULUS GUTTATUS** LAWR.  
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197. **POECETES GRAMINEUS** (GM.) BAIRD.  
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- 197 a. **POECETES GRAMINEUS CONFINIS** BAIRD.  
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198. **COTURNICULUS PASSERINUS** (WILS.) BP.  
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- 198 a. **COTURNICULUS PASSERINUS PERPALLIDUS** RIDGW.  
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199. **COTURNICULUS HENSLOWI** (AUD.) BP.  
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200. **COTURNICULUS LECONTEI** (AUD.) BP.  
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201. **AMMODROMUS CAUDACUTUS** (GM.) SWAINS.  
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- 201 a. **AMMODROMUS CAUDACUTUS NELSONI** ALLEN.  
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202. **AMMODROMUS MARITIMUS** (WILS.) SWAINS.  
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- 204a. **CHONDESTES GRAMMICA STRIGATA** (SW.) RIDGW.  
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205. **ZONOTRICHIA QUERULA** (NUTT.) GAMB.  
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206. **ZONOTRICHIA LEUCOPHRYS** (FORST.) SWAINS.  
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207. **ZONOTRICHIA GAMBELI** (NUTT.) GAMB.  
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- 207a. **ZONOTRICHIA GAMBELI INTERMEDIA** RIDGW.  
Intermediate White-crowned Sparrow. [346.]
208. **ZONOTRICHIA CORONATA** (PALL.) BAIRD.  
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209. **ZONOTRICHIA ALBICOLLIS** (GM.) BP.  
White-throated Sparrow. [349.]
210. **SPIZELLA MONTANA** (FORST.) RIDGW.  
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211. **SPIZELLA DOMESTICA** (BARTR.) COUES.  
Chipping Sparrow. [359.]
- 211a. **SPIZELLA DOMESTICA ARIZONÆ** (COUES) RIDGW.  
Western Chipping Sparrow.
212. **SPIZELLA PALLIDA** (SW.) BP.  
Clay-colored Sparrow. [360.]
213. **SPIZELLA BREWERI** CASS.  
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214. **SPIZELLA PUSILLA** (WILS.) BP.  
Field Sparrow. [358.]
215. **SPIZELLA ATROGULARIS** (CABAN.) BD.  
Black-chinned Sparrow. [362.]
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217. **JUNCO HYEMALIS** (LINN.) SCL.  
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218. **JUNCO OREGONUS** (TOWNS.) SCL.  
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219. **JUNCO ANNECTENS** BAIRD.  
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220. **JUNCO CANICEPS** (WOODH.) BAIRD.  
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221. **JUNCO DORSALIS** HENRY.  
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222. *JUNCO CINEREUS* (SWAINS.) CABAN.  
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223. *JUNCO INSULARIS* RIDGW.  
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224. *AMPHISPIZA BILINEATA* (CASS.) COUES.  
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225. *AMPHISPIZA BELLII* (CASS.) COUES.  
Bell's Sparrow. [356.]
- 225 a. *AMPHISPIZA BELLII NEVADENSIS* RIDGW.  
Sagebrush Sparrow.
226. *PEUCÆA ÆSTIVALIS* (LIGHT.) CABAN.  
Bachman's Finch. [370.]
- 226 a. *PEUCÆA ÆSTIVALIS ILLINOENSIS* RIDGW.  
Oak-woods Sparrow.
227. *PEUCÆA ARIZONÆ* RIDGW.  
Arizona Sparrow.
228. *PEUCÆA CASSINI* (WOODH.) BAIRD.  
Cassin's Sparrow. [371.]
229. *PEUCÆA CARPALIS* COUES.  
Rufous-winged Sparrow.
230. *PEUCÆA RUFICEPS* (CASS.) BAIRD.  
Rufous-crowned Sparrow. [372.]
- 230 a. *PEUCÆA RUFICEPS BOUCARDI* (SCL.) B. B. & R.  
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231. *MELOSPIZA FASCIATA* (FORST.) SCOTT.  
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- 231 a. *MELOSPIZA FASCIATA FALLAX* BAIRD.  
Mountain Song Sparrow. [367.]
- 231 b. *MELOSPIZA FASCIATA HEERMANNI* BAIRD.  
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- 231 c. *MELOSPIZA FASCIATA SAMUELIS* BAIRD.  
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- 231 d. *MELOSPIZA FASCIATA GUTTATA* (NUTT.) BAIRD.  
Rusty Song Sparrow. [366.]
- 231 e. *MELOSPIZA FASCIATA RUFINA* (BRANDT) BAIRD.  
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232. *MELOSPIZA CINEREA* (GM.) RIDGW.  
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233. *MELOSPIZA PALUSTRIS* (WILS.) BAIRD.  
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234. **MELOSPIZA LINCOLNI** (AUD.) BAIRD.  
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235. **PASSERELLA ILIACA** (MERREM) SW.  
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- 235 a. **PASSERELLA ILIACA UNALASHKENSIS** (GM.) RIDGW.  
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- 235 b. **PASSERELLA ILIACA MEGARHYNCHA** (BAIRD) RIDGW.  
Thick-billed Sparrow. [376 a.]
- 235 c. **PASSERELLA ILIACA SCHISTACEA** (BAIRD) ALLEN.  
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236. **EMBERNAGRA RUFIVIRGATA** LAWR.  
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237. **PIPILO ERYTHROPHthalmus** (LINN.) VIEILL.  
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- 237 a. **PIPILO ERYTHROPHthalmus ALLENI** COUES.  
Florida Towhee.
238. **PIPILO MACULATUS ARCTICUS** (SWAINS.) COUES.  
Northern Towhee. [393.]
- 238 a. **PIPILO MACULATUS MEGALONYX** (BAIRD) COUES.  
Spurred Towhee. [394.]
- 238 b. **PIPILO MACULATUS OREGONUS** (BELL) COUES.  
Oregon Towhee. [392.]
- 238 c. **PIPILO MACULATUS CONSOBRINUS** RIDGW.  
Guadalupe Towhee.
- 238 d. **PIPILO MACULATUS CARMANI** BAIRD.  
Socorro Towhee.
239. **PIPILO CHLORURUS** (TOWNS.) BAIRD.  
Green-tailed Towhee. [398.]
240. **PIPILO FUSCUS MESOLEUCUS** (BAIRD) RIDGW.  
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- 240 a. **PIPILO FUSCUS ALBIGULA** (BAIRD) COUES.  
Saint Lucas Brown Towhee.
- 240 b. **PIPILO FUSCUS CRISSALIS** (VIG.) COUES.  
Californian Brown Towhee. [396.]
241. **PIPILO ABERTI** BAIRD.  
Abert's Towhee. [395.]
242. **CARDINALIS VIRGINIANUS** (BRISS.) BP.  
Cardinal Grosbeak. [390.]
- 242 a. **CARDINALIS VIRGINIANUS IGNEUS** (BAIRD) COUES.  
Saint Lucas Cardinal.

243. **PYRRHULOXIA SINUATA** BONAP.  
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244. **ZAMELODIA LUDOVICIANA** (LINN.) COUES.  
Rose-breasted Grosbeak. [380.]
245. **ZAMELODIA MELANOCEPHALA** (SWAINS.) COUES.  
Black-headed Grosbeak. [381.]
246. **GUIRACA CÆRULEA** (LINN.) SWAINS.  
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247. **PASSERINA PARRELLINA** (BP.) RIDGW.  
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248. **PASSERINA CYANEA** (LINN.) GRAY.  
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249. **PASSERINA AMCENA** (SAY) GRAY.  
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250. **PASSERINA VERSICOLOR** (BONAP.) GRAY.  
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251. **PASSERINA CIRIS** (LINN.) GRAY.  
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252. **SPERMOPHILA MORELETII** PUCHERAN.  
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253. **PHONIPARA ZENA** (LINN.) BRYANT.  
Black-faced Seedeater.
254. **SPIZA AMERICANA** (GM.) BONAP.  
Black-throated Bunting. [378.]
255. **SPIZA TOWNSENDI** (AUD.) RIDGW.  
Townsend's Bunting. [379.]
256. **CALAMOSPIZA BICOLOR** (TOWNS.) BONAP.  
Lark Bunting. [377.]
257. **DOLICHONYX ORYZIVORUS** (LINN.) SWAINS.  
Bobolink. [399.]
258. **MOLOTHRUS ATER** (BODD.) GRAY.  
Cowbird. [400.]
- 258a. **MOLOTHRUS ATER OBSCURUS** (GMEL.) COUES.  
Dwarf Cowbird.
259. **MOLOTHRUS ÆNEUS** (WAGL.) CABAN.  
Bronzed Cowbird.
260. **XANTHOCEPHALUS ICTEROCEPHALUS** (BONAP.) BD.  
Yellow-headed Blackbird. [404.]
261. **AGELÆUS PHCENICEUS** (LINN.) VIEILL.  
Red-and-buff-shouldered Blackbird. [401.]



- 261a. **AGELÆUS PHENICEUS GUBERNATOR** (WAGL.) COUES.  
Red-and-black-shouldered Blackbird. [402.]
262. **AGELÆUS TRICOLOR** (NUTT.) BP.  
Red-and-white-shouldered Blackbird. [403.]
263. **STURNELLA MAGNA** (LINN.) SWAINS.  
Meadow Lark. [406.]
- 263a. **STURNELLA MAGNA MEXICANA** (SCL.) RIDGW.  
Mexican Meadow Lark.
264. **STURNELLA NEGLECTA** AUD.  
Western Meadow Lark. [407.]
265. **ICTERUS VULGARIS** DAUD.  
Troupial. [408.]
266. **ICTERUS AUDUBONII** GIRAUD.  
Audubon's Oriole. [409.]
267. **ICTERUS WAGLERI** SCL.  
Wagler's Oriole. [412.]
268. **ICTERUS PARISORUM** BONAP.  
Scott's Oriole. [411.]
269. **ICTERUS CUCULLATUS** SWAINS.  
Hooded Oriole. [413.]
270. **ICTERUS SPURIUS** (LINN.) BP.  
Orchard Oriole. [414.]
271. **ICTERUS GALBULA** (LINN.) COUES.  
Baltimore Oriole. [415.]
272. **ICTERUS BULLOCKI** (SWAINS.) BP.  
Bullock's Oriole. [416.]
273. **SCOLECOPHAGUS FERRUGINEUS** (GM.) SWAINS.  
Rusty Blackbird. [417.]
274. **SCOLECOPHAGUS CYANOCEPHALUS** (WAGL.) CABAN.  
Brewer's Blackbird. [418.]
275. **QUISCALUS MACRURUS** SWAINS.  
Great-tailed Grackle. [419.]
276. **QUISCALUS PALUSTRIS** SWAINS.  
Mexican Boat-tailed Grackle.
277. **QUISCALUS MAJOR** VIEILL.  
Boat-tailed Grackle. [420.]
278. **QUISCALUS PURPUREUS** (BARTR.) LEICHT.  
Purple Grackle. [421.]
- 278a. **QUISCALUS PURPUREUS AGLÆUS** (BAIRD) COUES.  
Florida Grackle. [422.]

- 278*b*. **QUISCALUS PURPUREUS ZENEUS** RIDGW.  
Bronzed Grackle.
- [279.] **STURNUS VULGARIS** LINN.  
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280. **CORVUS CORAX CARNIVORUS** (BARTR.) RIDGW.  
American Raven. [423, 424.]
281. **CORVUS CRYPTOLEUCUS** COUCH.  
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282. **CORVUS FRUGIVORUS** BARTR.  
Common Crow. [426.]
- 282*a*. **CORVUS FRUGIVORUS FLORIDANUS** (BAIRD) RIDGW.  
Florida Crow. [427.]
- 282*b*. **CORVUS FRUGIVORUS CAURINUS** (BAIRD) RIDGW.  
Northwestern Fish Crow. [428.]
283. **CORVUS OSSIFRAGUS** WILS.  
Fish Crow. [429.]
284. **PICICORVUS COLUMBIANUS** (WILS.) BP.  
Clarke's Nutcracker. [430.]
285. **GYMNOCITTA CYANOCEPHALA** MAX.  
Maximilian's Nutcracker; Piñon Jay. [431.]
286. **PICA RUSTICA HUDSONICA** (SCOP.) BAIRD.  
Black-billed Magpie. [432.]
287. **PICA NUTTALLI** AUD.  
Yellow-billed Magpie. [433.]
288. **PSILORHINUS MORIO** (WAGL.) GRAY.  
Brown Jay. [444.]
289. **CYANOCITTA CRISTATA** (LINN.) STRICKL.  
Blue Jay. [434.]
290. **CYANOCITTA STELLERI** (GM.) CABAN.  
Steller's Jay. [435.]
- 290*a*. **CYANOCITTA STELLERI FRONTALIS** RIDGW.  
Blue-fronted Jay.
- 290*b*. **CYANOCITTA STELLERI ANNECTENS** (BAIRD) RIDGW.  
Black-headed Jay.
- 290*c*. **CYANOCITTA STELLERI MACROLOPHA** (BAIRD) RIDGW.  
Long-crested Jay. [436.]
291. **APHELOCOMA FLORIDANA** (BARTR.) CABAN.  
Florida Jay. [439.]
292. **APHELOCOMA WOODHOUSEI** (BAIRD) RIDGW.  
Woodhouse's Jay. [438.]

293. **APHELOCOMA CALIFORNICA** (VIG.) CABAN.  
California Jay. [437.]
294. **APHELOCOMA ULTRAMARINA COUCHII** BAIRD.  
Couch's Jay. [441.]
295. **APHELOCOMA SORDIDA ARIZONÆ** RIDGW.  
Arizona Jay. [440.]
296. **XANTHURA LUXUOSA** (LESS.) BP.  
Green Jay. [442.]
297. **PERISOREUS CANADENSIS** (LINN.) BP.  
Canada Jay. [443.]
- 297 *a*. **PERISOREUS CANADENSIS CAPITALIS** BAIRD.  
White-headed Jay.
- 297 *b*. **PERISOREUS CANADENSIS FUMIFRONS** RIDGW.  
Smoky-fronted Jay.
298. **PERISOREUS OBSCURUS** RIDGW.  
Oregon Jay.
- [299.] **ALAUDA ARVENSIS** LINN.  
Sky Lark.
300. **EREMOPHILA ALPESTRIS** (FORST.) BOIE.  
Shore Lark. [302.]
- 300 *a*. **EREMOPHILA ALPESTRIS LEUCOLÆMA** COUES.  
White-throated Shore Lark.
- 300 *b*. **EREMOPHILA ALPESTRIS CHRYSOLÆMA** (WAGL.) COUES.  
Mexican Shore Lark.
301. **MILVULUS FORFICATUS** (GM.) SWAINS.  
Scissor-tailed Flycatcher. [123.]
- [302.] **MILVULUS TYRANNUS** (LINN.) BP.  
Fork-tailed Flycatcher. [122.]
303. **TYRANNUS DOMINICENSIS** (GM.) REICH.  
Gray Kingbird. [125.]
304. **TYRANNUS CAROLINENSIS** (LINN.) TENN.  
Kingbird; Bee Martin. [124.]
305. **TYRANNUS MELANCHOLICUS COUCHII** BAIRD.  
Couch's Kingbird. [128, 129.]
306. **TYRANNUS VERTICALIS** SAY.  
Western Kingbird. [126.]
307. **TYRANNUS VOCIFERANS** SWAINS.  
Cassin's Kingbird. [127.]
308. **PITANGUS DERBIANUS** (KAUF) SCH.  
Mexican Pitangus.

309. **MYIOZETETES TEXENSIS** (GIRAUD) SCL.  
Giraud's Flycatcher.
310. **MYIODINASTES LUTEIVENTRIS** BONAP.  
Henshaw's Flycatcher.
311. **MYIARCHUS MEXICANUS** (KAUP) LAWR.  
Mexican Great Crested Flycatcher. [132.]
312. **MYIARCHUS CRINITUS** (LINN.) CABAN.  
Great Crested Flycatcher. [130.]
313. **MYIARCHUS CINERASCENS** LAWR.  
Ash-throated Flycatcher. [131.]
314. **MYIARCHUS LAWRENCEI** (GIRAUD) BAIRD.  
Lawrence's Flycatcher. [133.]
315. **SAYORNIS FUSCUS** (GMEL.) BAIRD.  
Phoebe Bird; Pewee. [135.]
316. **SAYORNIS SAYI** (BONAP.) BAIRD.  
Say's Pewee. [136.]
317. **SAYORNIS NIGRICANS** (SWAINS.) BP.  
Black Pewee. [134.]
318. **CONTOPUS BOREALIS** (SWAINS.) BAIRD.  
Olive-sided Flycatcher. [137.]
319. **CONTOPUS PERTINAX** CABAN.  
Coues's Flycatcher.
320. **CONTOPUS VIRENS** (LINN.) CABAN.  
Wood Pewee. [139.]
321. **CONTOPUS RICHARDSONII** (SW.) BAIRD.  
Western Wood Pewee. [138.]
322. **EMPIDONAX FLAVIVENTRIS** BAIRD.  
Yellow-bellied Flycatcher. [144.]
323. **EMPIDONAX DIFFICILIS** BAIRD.  
Western Yellow-bellied Flycatcher. [144a.]
324. **EMPIDONAX ACADICUS** (GMEL.) BAIRD.  
Acadian Flycatcher. [143.]
325. **EMPIDONAX PUSILLUS** (SWAINS.) BD.  
Little Flycatcher. [141.]
- 325a. **EMPIDONAX PUSILLUS TRAILLII** (AUD.) BAIRD.  
Traill's Flycatcher. [140.]
326. **EMPIDONAX MINIMUS** BAIRD.  
Least Flycatcher. [142.]
327. **EMPIDONAX HAMMONDI** (XANTUS) BD.  
Hammond's Flycatcher. [145.]

323. **EMPIDONAX OBSCURUS** (SWAINS.) BAIRD.  
Wright's Flycatcher. [146.]
329. **EMPIDONAX FULVIFRONS** (GIRAUD) SCL.  
Fulvous Flycatcher.
- 329a. **EMPIDONAX FULVIFRONS PALLESCENS** COUES.  
Buff-breasted Flycatcher.
330. **PYROCEPHALUS RUBINEUS MEXICANUS** (SCL.) COUES.  
Vermilion Flycatcher. [147.]
331. **ORNITHION IMBERBE** (SCL.) COUES.  
Small-billed Flycatcher.
332. **PACHYRHAMPHUS MAJOR** (BONAP.) SCL.  
Thick-billed Flycatcher. [121.]
333. **HADROSTOMUS AGLAIÆ** (LAFR.) CAB.  
Rose-throated Flycatcher. [120.]
334. **EUGENES FULGENS** (SWAINS.) GOULD.  
Refulgent Hummingbird.
335. **TROCHILUS COLUBRIS** LINN.  
Ruby-throated Hummingbird. [101.]
336. **TROCHILUS ALEXANDRI** BOURC. & MULS.  
Black-chinned Hummingbird. [102.]
337. **CALYPTE COSTÆ** (BOURC.) GOULD.  
Costa's Hummingbird. [106.]
338. **CALYPTE ANNÆ** (LESS.) GOULD.  
Anna's Hummingbird. [105.]
339. **SELASPHORUS PLATYCERCUS** (SWAINS.) BP.  
Broad-tailed Hummingbird. [104.]
340. **SELASPHORUS RUFUS** (GMEL.) AUD.  
Rufous Hummingbird. [103.]
341. **SELASPHORUS ALLENI** HENSH.  
Allen's Hummingbird.
342. **ATTHIS HELOISÆ** (LESS.) REICH.  
Heloise's Hummingbird.
343. **STELLULA CALLIOPE** GOULD.  
Calliope Hummingbird.
344. **CALOTHORAX LUCIFER** (SWAINS.) GRAY.  
Lucifer Hummingbird.
345. **AMAZILIA FUSCICAUDATA** (FRASER) RIDGW.  
Rieffer's Hummingbird.
346. **AMAZILIA YUCATANENSIS** (CABOT) GOULD.  
Buff-bellied Hummingbird.



347. **BASILINNA XANTUSI** (LAWR.) ELLIOT.  
Xantus's Hummingbird.
348. **IACHE LATIROSTRIS** (SWAINS.) ELLIOT.  
Broad-billed Hummingbird.
349. **CYPSELUS SAXATILIS** WOODH.  
White-throated Swift. [107.]
350. **CYPSELOIDES NIGER BOREALIS** (KENNERLY) RIDGW.  
Black Swift. [108.]
351. **CHÆTURA PELAGICA** (LINN.) BAIRD.  
Chimney Swift. [109.]
352. **CHÆTURA VAUXII** (TOWNS.) DE KAY.  
Vaux's Swift. [110.]
353. **ANTROSTOMUS CAROLINENSIS** (GM.) GOULD.  
Chuck-will's-widow. [111.]
354. **CAPRIMULGUS VOCIFERUS** (WILS.) BP.  
Whip-poor-will. [112.]
355. **PHALÆNOPTILUS NUTTALLI** (AUD.) RIDGW.  
Poor-will. [113.]
356. **NYCTIDROMUS ALBICOLLIS** (GM.) BURM.  
Parauque Goatsucker. [116a.]
357. **CHORDEILES POPETUE** (VIEILL.) BD.  
Nighthawk. [114.]
- 357 a. **CHORDEILES POPETUE HENRYI** (CASS.) ALLEN.  
Western Nighthawk. [115.]
- 357 b. **CHORDEILES POPETUE MINOR** (CABAN.) RIDGW.  
Cuban Nighthawk.
358. **CHORDEILES ACUTIPENNIS TEXENSIS** (LAWR.) RIDGW.  
Texan Nighthawk. [116.]
359. **CAMPEPHILUS PRINCIPALIS** (LINN.) GRAY.  
Ivory-billed Woodpecker. [72.]
360. **PICUS VILLOSUS** LINN.  
Hairy Woodpecker. [74.]
- 360 a. **PICUS VILLOSUS LEUCOMELAS** (BODD.) RIDGW.  
Great White-backed Sapsucker.
- 360 b. **PICUS VILLOSUS HARRISI** (AUD.) ALLEN.  
Harris's Woodpecker. [75.]
361. **PICUS PUBESCENS** LINN.  
Downy Woodpecker. [76.]
- 361 a. **PICUS PUBESCENS GAIRDNERI** (AUD.) COUES.  
Gairdner's Woodpecker. [77.]

362. **PICUS QUERULUS** WILS.  
Red-cockaded Woodpecker. [80.]
363. **PICUS SCALARIS** WAGL.  
Texan Sapsucker. [79.]
- 363 a. **PICUS SCALARIS LUCASANUS** (XANT.) RIDGW.  
Saint Lucas Sapsucker.
364. **PICUS NUTTALLI** GAMB.  
Nuttall's Woodpecker. [78.]
365. **PICUS STRICKLANDI** MALIL.  
Strickland's Woodpecker.
366. **XENOPICUS ALBOLARVATUS** (CASS.) BAIRD.  
White-headed Woodpecker. [81.]
367. **PICOIDES ARCTICUS** (SWAINS.) GRAY.  
Black-backed Three-toed Woodpecker. [82.]
368. **PICOIDES TRIDACTYLUS AMERICANUS** (BREHM) RIDGW.  
Banded-backed Three-toed Woodpecker. [83.]
- 368 a. **PICOIDES TRIDACTYLUS DORSALIS** (BAIRD) RIDGW.  
Striped-backed Three-toed Woodpecker. [84.]
369. **SPHYRAPICUS VARIUS** (LINN.) BAIRD.  
Yellow-bellied Woodpecker. [85.]
- 369 a. **SPHYRAPICUS VARIUS NUCHALIS** BAIRD.  
Red-naped Woodpecker. [86.]
- 369 b. **SPHYRAPICUS VARIUS RUBER** (GM.) RIDGW.  
Red-breasted Woodpecker. [87.]
370. **SPHYRAPICUS THYROIDEUS** (CASS.) BAIRD.  
Black-breasted Woodpecker. [88, 89.]
371. **HYLOTOMUS PILEATUS** (LINN.) BAIRD.  
Pileated Woodpecker; Logcock. [90.]
372. **CENTURUS CAROLINUS** (L.) BP.  
Red-bellied Woodpecker. [91.]
373. **CENTURUS AURIFRONS** WAGL.  
Golden-fronted Woodpecker. [92.]
374. **CENTURUS UROPYGIALIS** BAIRD.  
Gila Woodpecker. [93.]
375. **MELANERPES ERYTHROCEPHALUS** (LINN.) SW.  
Red-headed Woodpecker. [94.]
376. **MELANERPES TORQUATUS** (WILS.) BONAP.  
Lewis's Woodpecker. [96.]
377. **MELANERPES FORMICIVORUS** (SW.) BP.  
Californian Woodpecker. [95.]

- 377a. **MELANERPES FORMICIVORUS ANGUSTIFRONS** BAIRD.  
Narrow-fronted Woodpecker.
378. **COLAPTES AURATUS** (LINN.) SW.  
Yellow-shafted Flicker. [97.]
- 378a. **COLAPTES AURATUS HYBRIDUS** (BAIRD) RIDGW.  
"Hybrid" Flicker. [98a.]
- 378b. **COLAPTES AURATUS MEXICANUS** (SW.) RIDGW.  
Red-shafted Flicker. [98.]
379. **COLAPTES CHRYSOIDES** (MALH.) BAIRD.  
Malherbe's Flicker. [99.]
380. **COLAPTES RUFIPILEUS** RIDGW.  
Guadalupe Flicker.
381. **MOMOTUS CÆRULEICEPS** GOULD.  
Blue-capped Motmot. [119.]
382. **CERYLE ALCYON** (LINN.) BOIE.  
Belted Kingfisher. [117.]
383. **CERYLE AMERICANA CABANISI** (TSCHUDI) COUES.  
Texan Kingfisher. [118.]
384. **TROGON AMBIGUUS** GOULD.  
Coppery-tailed Trogon. [65.]
385. **GEOCOCYX CALIFORNIANUS** (LESS.) BAIRD.  
Road-runner; Chaparral Cock. [68.]
386. **COCCYZUS SENICULUS** (LATH.) VIEILL.  
Mangrove Cuckoo. [71.]
387. **COCCYZUS AMERICANUS** (LINN.) BP.  
Yellow-billed Cuckoo. [69.]
388. **COCCYZUS ERYTHROPHthalmus** (WILS.) BAIRD.  
Black-billed Cuckoo. [70.]
389. **CROTOPHAGA ANI** LINN.  
Savannah Blackbird. [66, 67.]
390. **CROTOPHAGA SULCIROSTRIS** SWAINS.  
Groove-billed Crotophaga.
391. **RHYNCHOPSITTA PACHYRHYNCHA** (SWAINS.) BP.  
Thick-billed Parrot. [64.]
392. **CONURUS CAROLINENSIS** (LINN.) KUHIL.  
Carolina Parakeet. [63.]
393. **CONURUS HOLOCHLORUS BREVIPES** BAIRD.  
Socorro Parakeet.
394. **ALUCO FLAMMEUS AMERICANUS** (AUD.) RIDGW.  
American Barn Owl. [47.]

395. **ASIO AMERICANUS** (STEPH.) SHARPE.  
American Long-eared Owl. [51.]
396. **ASIO ACCIPITRINUS** (PALL.) NEWTON.  
Short-eared Owl. [52.]
397. **STRIX NEBULOSA** FORST.  
Barred Owl. [54.]
- 397 *a.* **STRIX NEBULOSA ALLENI** RIDGW.  
Florida Barred Owl.
398. **STRIX OCCIDENTALIS** (XANT.) RIDGW.  
Spotted Owl.
399. **ULULA CINEREA** (GMEL.) BP.  
Great Gray Owl. [53.]
- [399 *a.*] **ULULA CINEREA LAPPONICA** (RETZ.) RIDGW.  
Lapland Owl.
400. **NYCTALE TENGMALMI RICHARDSONI** (BP.) RIDGW.  
Richardson's Owl. [55.]
401. **NYCTALE ACADICA** (GMEL.) BP.  
Saw-whet Owl. [56, 57.]
402. **SCOPS ASIO** (LINN.) BP.  
Little Screech Owl. [49.]
- 402 *a.* **SCOPS ASIO FLORIDANUS** RIDGW.  
Florida Screech Owl.
- 402 *b.* **SCOPS ASIO MACCALLI** (CASS.) RIDGW.  
Texan Screech Owl. [50.]
- 402 *c.* **SCOPS ASIO MAXWELLIÆ** RIDGW.  
Rocky Mountain Screech Owl.
- 402 *d.* **SCOPS ASIO KENNICOTTII** (ELLIOT) RIDGW.  
Northwestern Screech Owl.
403. **SCOPS TRICHOPSIS** WAGL.  
Mexican Screech Owl.
404. **SCOPS FLAMMEOLUS** (LICHT.) SCL.  
Flammulated Screech Owl.
405. **BUBO VIRGINIANUS** (GM.) BP.  
Great Horned Owl. [48.]
- 405 *a.* **BUBO VIRGINIANUS SUBARCTICUS** (HOY) RIDGW.  
Western Horned Owl.
- 405 *b.* **BUBO VIRGINIANUS ARCTICUS** (SWAINS.) CASS.  
Arctic Horned Owl.
- 405 *c.* **BUBO VIRGINIANUS SATURATUS** RIDGW.  
Dusky Horned Owl.

406. *NYCTEA SCANDIACA* LINN.  
Snowy Owl. [61.]
407. *SURNIA FUNEREA* (LINN.) RICH & SW.  
American Hawk Owl. [62.]
- [407 a.] *SURNIA FUNEREA ULULA* (LINN.) RIDGW.  
European Hawk Owl.
408. *SPEOTYTO CUNICULARIA HYPOGÆA* (BONAP.) RIDGW.  
Burrowing Owl. [58, 59.]
- 408 a. *SPEOTYTO CUNICULARIA FLORIDANA* RIDGW.  
Florida Burrowing Owl.
409. *GLAUCIDIUM GNOMA* WAGL.  
California Pigmy Owl. [60.]
410. *GLAUCIDIUM PHALÆNOIDES* (DAUD.) SCL. & SALV.  
Ferruginous Pigmy Owl.
411. *MICRATHENE WHITNEYI* (COOPER) COUES.  
Whitney's Pigmy Owl.
412. *HIEROFALCO GYRFALCO CANDICANS* (GM.) RIDGW.  
White Gyrfalcon. [11.]
- 412 a. *HIEROFALCO GYRFALCO ISLANDUS* (GM.) RIDGW.  
Iceland Gyrfalcon. [12.]
- 412 b. *HIEROFALCO GYRFALCO SACER* (FORST.) RIDGW.  
McFarlane's Gyrfalcon.
- 412 c. *HIEROFALCO GYRFALCO OBSOLETUS* (GM.) RIDGW.  
Labrador Gyrfalcon.
413. *HIEROFALCO MEXICANUS POLYAGRUS* (CASS.) RIDGW.  
Prairie Falcon. [10.]
414. *FALCO PEREGRINUS NÆVIUS* (GM.) RIDGW.  
American Peregrine Falcon; Duck Hawk. [5, 6.]
- 414 a. *FALCO PEREGRINUS PEALEI* RIDGW.  
Peale's Falcon.
415. *FALCO ALBIGULARIS* DAUD.  
Chestnut-thighed Falcon. [8.]
- [416.] *ÆSALON REGULUS* (PALL.) BLYTH.  
European Merlin.
417. *ÆSALON COLUMBARIUS* (LINN.) KAUP.  
Pigeon Hawk. [7.]
- 417 a. *ÆSALON COLUMBARIUS SUCKLEYI* RIDGW.  
Black Merlin.
418. *ÆSALON RICHARDSONII* RIDGW.  
Richardson's Merlin.



419. **RHYNCHOFALCO FUSCO-CÆRULESCENS** (VIEILL.) RIDGW.  
Aplomado Falcon. [9.]
420. **TINNUNCULUS SPARVERIUS** (LINN.) VIEILL.  
Sparrow Hawk. [13.]
- 420 a. **TINNUNCULUS SPARVERIUS ISABELLINUS** (SWAINS.) RIDGW.  
Isabelline Sparrow Hawk.
421. **TINNUNCULUS SPARVERIOIDES** (VIG.) GRAY.  
Cuban Sparrow Hawk.
- [422.] **TINNUNCULUS ALAUDARIUS** (GM.) GRAY.  
European Kestrel.
423. **POLYBORUS CHERIWAY** (JACQ.) CABAN.  
Caracara Eagle. [45.]
424. **POLYBORUS LUTOSUS** RIDGW.  
Guadalupe Caracara.
425. **PANDION HALIAËTUS CAROLINENSIS** (GM.) RIDGW.  
American Osprey; Fish Hawk. [44.]
426. **ELANOIDES FORFICATUS** (LINN.) RIDGW.  
Swallow-tailed Kite. [34.]
427. **ELANUS GLAUCUS** (BARTR.) COUES.  
White-tailed Kite. [35.]
428. **ICTINIA SUBCÆRULEA** (BARTR.) COUES.  
Mississippi Kite. [36.]
429. **ROSTRHAMUS SOCIABILIS PLUMBEUS** RIDGW.  
Everglade Kite. [37.]
430. **CIRCUS HUDSONIUS** (LINN.) VIEILL.  
Marsh Hawk. [38.]
431. **ACCIPITER COOPERI** BONAP.  
Cooper's Hawk. [15, 16.]
432. **ACCIPITER FUSCUS** (GMEL.) BP.  
Sharp-shinned Hawk. [17.]
433. **ASTUR ATRICAPILLUS** (WILS.) BP.  
American Goshawk. [14.]
- 433 a. **ASTUR ATRICAPILLUS STRIATULUS** RIDGW.  
Western Goshawk.
434. **ANTENOR UNICINCTUS HARRISI** (AUD.) RIDGW.  
Harris's Hawk. [46.]
- [435.] **BUTEO VULGARIS** LEACH.  
European Buzzard.
436. **BUTEO BOREALIS** (GM.) VIEILL.  
Red-tailed Hawk. [23.]

- 436a. *BUTEO BOREALIS KRIDERI* HOOPES.  
Krider's Hawk.
- 436b. *BUTEO BOREALIS CALURUS* (CASS.) RIDGW.  
Western Red-tail. [20, 24.]
- 436c. *BUTEO BOREALIS LUCASANUS* RIDGW.  
Saint Lucas Red-tail.
- 436d. *BUTEO BOREALIS SOCORROENSIS* RIDGW.  
Socorro Red-tail.
437. *BUTEO COOPERI* CASS.  
Cooper's Henhawk. [29.]
438. *BUTEO HARLANI* AUD.  
Harlan's Hawk. [22.]
439. *BUTEO LINEATUS* (GM.) JARD.  
Red-shouldered Hawk. [25.]
- 439a. *BUTEO LINEATUS ELEGANS* (CASS.) RIDGW.  
Red-bellied Hawk. [26.]
440. *BUTEO ABBREVIATUS* CABAN.  
Zone-tailed Hawk.
441. *BUTEO ALBICAUDATUS* VIEILL.  
White-tailed Hawk.
442. *BUTEO SWAINSONI* BONAP.  
Swainson's Hawk. [18, 19, 21, 23.]
443. *BUTEO PENNSYLVANICUS* (WILS.) BP.  
Broad-winged Hawk. [27.]
444. *URUBITINGA ANTHRACINA* (LICHT.) LAFR.  
Mexican Black Hawk.
445. *ASTURINA NITIDA PLAGIATA* (LICHT.) RIDGW.  
Mexican Goshawk. [33.]
446. *ONYCHOTES GRUBERI* RIDGW.  
Gruber's Hawk.
447. *ARCHIBUTEO LAGOPUS SANCTI-JOHANNIS* (GMEL.) RIDGW.  
American Rough-legged Hawk. [30, 31.]
448. *ARCHIBUTEO FERRUGINEUS* (LICHT.) GRAY.  
Ferruginous Rough-leg. [32.]
449. *AQUILA CHRYSÆTUS CANADENSIS* (LINN.) RIDGW.  
Golden Eagle. [39.]
450. *THRASAËTUS HARPYIA* (LINN.) GRAY.  
Harpy Eagle.
451. *HALIÆTUS LEUCOCEPHALUS* (LINN.) SAVIG.  
Bald Eagle; Gray Eagle. [41, 43.]

452. **HALIÆTUS ALBICILLA** (LINN.) LEACH.  
Gray Sea Eagle. [42.]
453. **PSEUDOGRYPHUS CALIFORNIANUS** (SHAW) RIDGW.  
Californian Condor. [2.]
454. **CATHARTES AURA** (LINN.) ILLIG.  
Turkey Buzzard. [1.]
455. **CATHARISTA ATRATA** (WILS.) LESS.  
Black Vulture; Carrion Crow. [3.]
456. **COLUMBA FASCIATA** SAY.  
Band-tailed Pigeon. [445.]
457. **COLUMBA ERYTHRINA** LICHT.  
Red-billed Pigeon. [446.]
458. **COLUMBA LEUCOCEPHALA** LINN.  
White-crowned Pigeon. [447.]
459. **ECTOPISTES MIGRATORIA** (LINN.) SW.  
Passenger Pigeon. [448.]
460. **ZENÆDURA CAROLINENSIS** (LINN.) BP.  
Mourning Dove. [451.]
461. **ZENÆDURA GRAYSONI** BAIRD.  
Socorro Dove.
462. **ZENÆDA AMABILIS** BP.  
Zenaida Dove. [449.]
463. **ENGYPSTILA ALBIFRONS** (BP.) COUES.  
White-fronted Dove.
464. **MELOPELIA LEUCOPTERA** (L.) BP.  
White-winged Dove. [450.]
465. **CHAMÆPELIA PASSERINA** (L.) SWAINS.  
Ground Dove. [453.]
466. **SCARDAFELLA INCA** (LESS.) BP.  
Scaled Dove. [452.]
467. **GEOTRYGON MARTINICA** (GM.) BP.  
Key West Dove. [454.]
468. **STARNCENAS CYANOCEPHALA** (LINN.) BP.  
Blue-headed Dove. [455.]
469. **ORTALIS VETULA MACCALLI** (BAIRD) RIDGW.  
Chachalaca; Texan Guan. [456.]
470. **MELEAGRIS GALLOPAVO** LINN.  
Mexican Turkey. [458.]
- 470a. **MELEAGRIS GALLOPAVO AMERICANA** (BARTR.) COUES.  
Wild Turkey. [457.]

471. *CANACE OBSCURA* (SAY) BP.  
Dusky Grouse. [459.]
- 471 *a.* *CANACE OBSCURA FULIGINOSA* RIDGW.  
Sooty Grouse.
- 471 *b.* *CANACE OBSCURA RICHARDSONII* (DOUGL.) BAIRD.  
Richardson's Grouse.
472. *CANACE CANADENSIS* (LINN.) BP.  
Canada Grouse; Spruce Partridge. [460.]
- 472 *a.* *CANACE CANADENSIS FRANKLINI* (DOUGL.) BAIRD  
Franklin's Grouse. [461.]
473. *BONASA UMBELLUS* (LINN.) STEPH.  
Ruffed Grouse. [465.]
- 473 *a.* *BONASA UMBELLUS UMBELLOIDES* (DOUGL.) BAIRD.  
Gray Ruffed Grouse. [465 *a.*]
- 473 *b.* *BONASA UMBELLUS SABINEI* (DOUGL.) COUES.  
Oregon Ruffed Grouse. [466.]
474. *LAGOPUS ALBUS* (GM.) AUD.  
Willow Ptarmigan. [467, 470.]
475. *LAGOPUS RUPESTRIS* (GM.) LEACH.  
Rock Ptarmigan. [468.]
476. *LAGOPUS LEUCURUS* SW.  
White-tailed Ptarmigan. [469.]
477. *CUPIDONIA CUPIDO* (LINN.) BAIRD.  
Prairie Hen. [464.]
- 477 *a.* *CUPIDONIA CUPIDO PALLIDICINCTA* RIDGW.  
Lesser Prairie Hen.
478. *PEDICECETES PHASIANELLUS* (L.) ELLIOT.  
Northern Sharp-tailed Grouse.
- 478 *a.* *PEDICECETES PHASIANELLUS COLUMBIANUS* (ORD) COUES.  
Common Sharp-tailed Grouse. [463.]
479. *CENTROCERCUS UROPHASIANUS* (BP.) SWAINS. \*  
Sage Cock. [462.]
480. *ORTYX VIRGINIANA* (L.) BP.  
Bob-white; American Quail. [471.]
- 480 *a.* *ORTYX VIRGINIANA FLORIDANA* COUES.  
Florida Quail.
- 480 *b.* *ORTYX VIRGINIANA TEXANA* (LAWR.) COUES.  
Texan Quail. [472.]
481. *OREORTYX PICTA* (DOUGL.) BAIRD.  
Mountain Quail. [473.]

- 481 a. **OREORTYX PICTA PLUMIFERA** (GOULD) RIDGW.  
Plumed Quail.
482. **LOPHORTYX CALIFORNICA** (SHAW) BP.  
Californian Quail. [474.]
483. **LOPHORTYX GAMBELI** NUTT.  
Gambel's Quail. [475.]
484. **CALLIPEPLA SQUAMATA** (VIG.) GRAY.  
Scaled Quail. [476.]
485. **CYRTONYX MASSENA** (LESS.) GOULD.  
Massena Quail. [477.]
486. **ARDEA OCCIDENTALIS** AUD.  
Great White Heron; Würdemann's Heron. [488, 489.]
487. **ARDEA HERODIAS** LINN.  
Great Blue Heron. [487.]
- [488.] **ARDEA CINEREA** LINN.  
Common European Heron.
489. **HERODIAS ALBA EGRETTA** (GMEL.) RIDGW.  
American Egret. [486, 486 a.]
490. **GARZETTA CANDIDISSIMA** (GMEL.) BP.  
Snowy Heron. [485.]
491. **DICHROMANASSA RUFA** (BODD.) RIDGW.  
Reddish Egret; Peale's Egret. [482, 483.]
492. **HYDRANASSA TRICOLOR LUDOVICIANA** (WILS.) RIDGW.  
Louisiana Heron. [484.]
493. **FLORIDA CÆRULEA** (LINN.) BAIRD.  
Little Blue Heron. [490.]
494. **BUTORIDES VIRESCENS** (LINN.) BP.  
Green Heron. [493.]
495. **NYCTIARDEA GRISEA NÆVIA** (BODD.) ALLEN.  
Black-crowned Night Heron. [495.]
496. **NYCTHERODIUS VIOLACEUS** (LINN.) REICH.  
White-crowned Night Heron. [496.]
497. **BOTAURUS LENTIGINOSUS** (MONTAG.) STEPH.  
American Bittern. [492.]
498. **ARDETTA EXILIS** (GMEL.) GRAY.  
Least Bittern. [491.]
499. **MYCTERIA AMERICANA** LINN.  
Jabiru.
500. **TANTALUS LOCULATOR** LINN.  
Wood Ibis. [497.]



501. *EUDOCIMUS ALBUS* (LINN.) WAGL.  
White Ibis. [499.]
502. *EUDOCIMUS RUBER* (LINN.) WAGL.  
Scarlet Ibis. [498.]
503. *PLEGADIS FALCINELLUS* (LINN.) KAUP.  
Glossy Ibis. [500.]
504. *PLEGADIS GUARAUNA* (LINN.) RIDGW.  
White-faced Glossy Ibis. [500a.]
505. *AJAJA ROSEA* (BRISS.) RIDGW.  
Roseate Spoonbill. [501.]
- [506.] *HÆMATOPUS OSTRALÉGUS* LINN.  
European Oystercatcher.
507. *HÆMATOPUS PALLIATUS* TEMM.  
American Oystercatcher. [512.]
508. *HÆMATOPUS NIGER* PALL.  
Black Oystercatcher. [513.]
509. *STREPSILAS INTERPRES* (LINN.) ILLIG.  
Turnstone. [515.]
510. *STREPSILAS MELANOCEPHALA* VIG.  
Black Turnstone. [516.]
511. *APHRIZA VIRGATA* (GMEL.) GRAY.  
Surf Bird. [511.]
- [512.] *VANELLUS CRISTATUS* MEYER.  
Lapwing.
513. *SQUATAROLA HELVETICA* (LINN.) CUV.  
Black-bellied Plover. [510.]
- [514.] *CHARADRIUS PLUVIALIS* LINN.  
Golden Plover.
515. *CHARADRIUS DOMINICUS* MÜLL.  
American Golden Plover. [503.]
- [515a.] *CHARADRIUS DOMINICUS FULVUS* (GMEL.) RIDGW.  
Pacific Golden Plover.
516. *OXYECHUS VOCIFERUS* (LINN.) REICH.  
Killdeer. [504.]
517. *ÆGIALITIS SEMIPALMATA* (BONAP.) CABAN.  
Semipalmated Plover. [507.]
518. *ÆGIALITIS HIATICULA* (LINN.) BOIE.  
Ringed Plover.
- [519.] *ÆGIALITIS CURONICA* (GMEL.) GRAY.  
Little Ringed Plover.

520. *ÆGIALITIS MELODA* (ORD) BP.  
Piping Plover. [508.]
- 520 a. *ÆGIALITIS MELODA CIRCUMCINCTA* RIDGW.  
Belted Piping Plover.
521. *ÆGIALITIS CANTIANA NIVOSA* (CASS.) RIDGW.  
Snowy Plover. [509.]
522. *OCHTHODROMUS WILSONIUS* (ORD) REICH.  
Wilson's Plover. [506.]
523. *PODASOCYS MONTANA* (TOWNS.) COUES.  
Mountain Plover. [505.]
- [524.] *SCOLOPAX RUSTICULA* LINN.  
European Woodcock.
525. *PHILOHELA MINOR* (GMEL.) GRAY.  
American Woodcock. [522.]
- [526.] *GALLINAGO MEDIA* LEACH.  
English Snipe.
- 526 a. *GALLINAGO MEDIA WILSONI* (TEMM.) RIDGW.  
Wilson's Snipe. [523.]
527. *MACRORHAMPHUS GRISEUS* (GMEL.) LEACH.  
Red-breasted Snipe; Gray Snipe. [524.]
- 527 a. *MACRORHAMPHUS GRISEUS SCOLOPACEUS* (SAY) COUES.  
Red-bellied Snipe; Greater Gray-back. [525.]
528. *MICROPALAMA HIMANTOPUS* (BONAP.) BAIRD.  
Stilt Sandpiper. [536.]
529. *TRINGA CANUTUS* LINN.  
Knot; Robin Snipe. [526.]
530. *ARQUATELLA MARITIMA* (BRÜNN.) BAIRD.  
Purple Sandpiper. [528.]
531. *ARQUATELLA COUESII* RIDGW.  
Aleutian Sandpiper.
532. *ARQUATELLA PTILOCNEMIS* (COUES) RIDGW.  
Prybilov Sandpiper.
- [533.] *ACTODROMAS ACUMINATA* (HORSF.) RIDGW.  
Sharp-tailed Sandpiper.
534. *ACTODROMAS MACULATA* (VIEILL.) COUES.  
Pectoral Sandpiper. [531.]
535. *ACTODROMAS COOPERI* (BAIRD) COUES.  
Cooper's Sandpiper. [527.]
536. *ACTODROMAS FUSCICOLLIS* (VIEILL.) RIDGW.  
Bonaparte's Sandpiper. [533.]

537. *ACTODROMAS BAIRDII* COUES.  
Baird's Sandpiper.
538. *ACTODROMAS MINUTILLA* (VIEILL.) BP.  
Least Sandpiper. [532.]
- [539.] *PELIDNA ALPINA* (LINN.) BOIE.  
European Dunlin.
- 539a. *PELIDNA ALPINA AMERICANA* CASS.  
Red-backed Sandpiper. [530.]
- [540.] *PELIDNA SUBARQUATA* (GULD.) CUV.  
Curlew Sandpiper. [529.]
541. *EREUNETES PUSILLUS* (LINN.) CASS.  
Semipalmated Sandpiper. [535.]
- 541a. *EREUNETES PUSILLUS OCCIDENTALIS* (LAWR.) COUES.  
Western Sandpiper.
542. *CALIDRIS ARENARIA* (LINN.) ILLIG.  
Sanderling. [534.]
543. *LIMOSA FEDOA* (LINN.) ORD.  
Marbled Godwit. [547.]
544. *LIMOSA LAPPONICA NOVÆ-ZEALANDIÆ* GRAY.  
Pacific Godwit.
545. *LIMOSA HÆMASTICA* (LINN.) COUES.  
Hudsonian Godwit. [548.]
- [546.] *LIMOSA ÆGOCEPHALA* (LINN.) LEACH.  
Black-tailed Godwit.
- [547.] *TOTANUS GLOTTIS* (LINN.) BECHST.  
Green-shank. [538.]
548. *TOTANUS MELANOLEUCUS* (GMEL.) VIEILL.  
Greater Yellow-legs; Tell-tale. [539.]
549. *TOTANUS FLAVIPES* (GMEL.) VIEILL.  
Yellow-legs. [540.]
550. *RHYACOPHILUS SOLITARIUS* (WILS.) CASS.  
Solitary Sandpiper. [541.]
- [551.] *RHYACOPHILUS OCHROPUS* (LINN.) RIDGW.  
Green Sandpiper.
552. *SYMPHEMIA SEMIPALMATA* (GMEL.) HARTL.  
Willet. [537.]
553. *HETEROSCELUS INCANUS* (GMEL.) COUES.  
Wandering Tattler. [542.]
- [554.] *MACHETES PUGNAX* (LINN.) CUV.  
Ruff. [544.]

555. **BARTRAMIA LONGICAUDA** (BECHST.) BP.  
Bartram's Sandpiper; Field Plover. [545.]
556. **TRYNGITES RUFESCENS** (VIEILL.) CABAN.  
Buff-breasted Sandpiper. [546.]
557. **TRINGOIDES MACULARIUS** (LINN.) GRAY.  
Spotted Sandpiper. [543.]
558. **NUMENIUS LONGIROSTRIS** WILS.  
Long-billed Curlew. [549.]
559. **NUMENIUS HUDSONICUS** LATH.  
Hudsonian Curlew. [550.]
560. **NUMENIUS BOREALIS** (FORST.) LATH.  
Eskimo Curlew. [551.]
- [561.] **NUMENIUS PHÆOPUS** (LINN.) LATH.  
Whimbrel.
- [562.] **NUMENIUS TAHITIENSIS** (GMEL.) CASS.  
Bristle-thighed Curlew.
563. **PHALAROPUS FULICARIUS** (LINN.) BP.  
Red Phalarope. [521.]
564. **LOBIPES HYPERBOREUS** (LINN.) CUV.  
Northern Phalarope. [520.]
565. **STEGANOPUS WILSONI** (SAB.) COUES.  
Wilson's Phalarope. [519.]
566. **RECURVIROSTRA AMERICANA** GMEL.  
American Avocet. [517.]
567. **HIMANTOPUS MEXICANUS** (MÜLL.) ORD.  
Black-necked Stilt. [518.]
568. **PARRA GYMNOSTOMA** WAGL.  
Mexican Jacana.
569. **RALLUS ELEGANS** AUD.  
Red-breasted Rail. [542.]
570. **RALLUS OBSOLETUS** RIDGW.  
Californian Clapper Rail.
571. **RALLUS LONGIROSTRIS CREPITANS** (GMEL.) RIDGW.  
Clapper Rail. [553.]
- 571a. **RALLUS LONGIROSTRIS SATURATUS** HENSIL.  
Louisiana Clapper Rail.
572. **RALLUS VIRGINIANUS** LINN.  
Virginian Rail. [554.]
- [573.] **PORZANA MARUETTA** (LEACH.) BP.  
Spotted Crane.

574. **PORZANA CAROLINA** (LINN.) BAIRD.  
Sora Rail. [555.]
575. **PORZANA NOVEBORACENSIS** (GMEL.) BAIRD.  
Little Yellow Rail. [557.]
576. **PORZANA JAMAICENSIS** (GMEL.) BAIRD.  
Little Black Rail. [556.]
- 576a. **PORZANA JAMAICENSIS COTURNICULUS** BAIRD.  
Farallone Rail.
- [577.] **CREX PRATENSIS** BECHST.  
Corn Crane. [558.]
578. **IONORNIS MARTINICA** (LINN.) REICH.  
Purple Gallinule. [561.]
579. **GALLINULA GALEATA** (LICHT.) BP.  
Florida Gallinule. [560.]
580. **FULICA AMERICANA** GMEL.  
American Coot. [559.]
581. **ARAMUS PICTUS** (BARTR.) COUES.  
The Limpkin. [481.]
582. **GRUS AMERICANA** (LINN.) TEMM.  
Whooping Crane. [478.]
583. **GRUS CANADENSIS** (LINN.) TEMM.  
Sandhill Crane. [479.]
584. **GRUS FRATERCULUS** CASS.  
Little Crane. [480.]
585. **PHŒNICOPTERUS RUBER** LINN.  
American Flamingo. [502.]
- [586.] **OLOR CYGNUS** (LINN.) BP.  
European Swan.
- [587.] **OLOR MINOR** (PALL.) BP.  
Bewick's Swan.
588. **OLOR AMERICANUS** (SHARPLESS) BP.  
Whistling Swan. [561a.]
589. **OLOR BUCCINATOR** (RICH.) WAGL.  
Trumpeter Swan. [562.]
590. **CHEN CÆRULESCENS** (LINN.) RIDGW.  
Blue-winged Goose. [564.]
591. **CHEN HYPERBOREUS** (PALL.) BOIE.  
Snow Goose. [563.]
- 591a. **CHEN HYPERBOREUS ALBATUS** (CASS.) RIDG.  
Lesser Snow Goose [563a.]



592. **CHEN ROSSII** (BAIRD) RIDGW.  
Ross's Snow Goose.
- [593.] **ANSER ALBIFRONS** GMEL.  
European White-fronted Goose.
- 593a. **ANSER ALBIFRONS GAMBELI** (HARTL.) COUES.  
American White-fronted Goose. [565, 566.]
594. **BERNICLA CANADENSIS** (LINN.) BOIE.  
Canada Goose. [567.]
- 594a. **BERNICLA CANADENSIS HUTCHINSI** (SW. & RICH.) WOODH.  
Hutchins's Goose. [569.]
- 594b. **BERNICLA CANADENSIS LEUCOPARIA** (BRANDT) CASS.  
White-cheeked Goose. [568.]
- 594c. **BERNICLA CANADENSIS OCCIDENTALIS** (BAIRD) DALL & BANN.  
Larger White-cheeked Goose. [567 a.]
595. **BERNICLA BRENTA** (PALL.) STEPH.  
Brant. [570.]
596. **BERNICLA NIGRICANS** (LAWR.) CASS.  
Black Brant. [571.]
- [597.] **BERNICLA LEUCOPSIS** (TEMM.) BOIE.  
Barnacle Goose. [572.]
598. **PHILACTE CANAGICA** (SEVAST.) BANNIST.  
Emperor Goose. [573.]
599. **DENDROCYGNA AUTUMNALIS** (LINN.) EYT.  
Black-bellied Tree Duck. [574.]
600. **DENDROCYGNA FULVA** (GMEL.) BURM.  
Fulvous Tree Duck. [575.]
601. **ANAS BOSCAS** LINN.  
Mallard. [576.]
602. **ANAS OBSCURA** GMEL.  
Black Duck. [577.]
603. **ANAS FULVIGULA** RIDGW.  
Florida Black Duck.
604. **CHAULELASMUS STREPERUS** (LINN.) GRAY.  
Gadwall. [584.]
605. **DAFILA ACUTA** (LINN.) BONAP.  
Pintail. [578.]
- [606.] **MARECA PENELOPE** (LINN.) SELBY.  
Widgeon. [586.]
607. **MARECA AMERICANA** (GMEL.) STEPH.  
Baldpate. [585.]

608. *SPATULA CLYPEATA* (LINN.) BOIE.  
Shoveller. [583.]
609. *QUERQUEDULA DISCORS* (LINN.) STEPH.  
Blue-winged Teal. [581.]
610. *QUERQUEDULA CYANOPTERA* (VIEILL.) CASS.  
Cinnamon Teal. [582.]
- [611.] *NETTION CRECCA* (LINN.) KAUP.  
English Teal. [580.]
612. *NETTION CAROLINENSIS* (GMEL.) BAIRD.  
Green-winged Teal. [579.]
613. *AIX SPONSA* (LINN.) BOIE.  
Wood Duck; Summer Duck. [587.]
614. *FULIX MARILA* (LINN.) BAIRD.  
Scaup Duck. [588.]
615. *FULIX AFFINIS* (EYT.) BAIRD.  
Little Blackhead. [589.]
616. *FULIX COLLARIS* (DONOV.) BAIRD.  
Ring-billed Blackhead. [590.]
617. *AYTHYA VALLISNERIA* (WILS.) BOIE.  
Canvas-back. [592.]
618. *AYTHYA AMERICANA* (EYT.) BP.  
Redhead. [591.]
619. *CLANGULA ISLANDICA* (GMEL.) BP.  
Barrow's Golden-eye. [594.]
620. *CLANGULA GLAUCIUM AMERICANA* (BP.) RIDGW.  
American Golden-eye. [593.]
621. *CLANGULA ALBEOLA* (LINN.) STEPH.  
Butterball; Bufflehead. [595.]
622. *HISTRIONICUS MINUTUS* (LINN.) DRESSER.  
Harlequin Duck. [596.]
623. *HARELDA GLACIALIS* (LINN.) LEACH.  
Long-tailed Duck; Old Squaw. [597.]
624. *CAMPTOLÆMUS LABRADORIUS* (GMEL.) GRAY.  
Labrador Duck. [600.]
625. *POLYSTICTA STELLERI* (PALL.) BRANDT.  
Steller's Duck. [598.]
626. *LAMPRONETTA FISCHERI* BRANDT.  
Fischer's Eider. [599.]
627. *SOMATERIA MOLLISSIMA* (LINN.) BOIE.  
Common Eider.

- 627 a. **SOMATERIA MOLLISSIMA DRESSERI** (SHARPE) COUES.  
American Eider. [606.]
628. **SOMATERIA V-NIGRA** GRAY.  
Pacific Eider. [607.]
629. **SOMATERIA SPECTABILIS** (LINN.) BOIE.  
King Eider. [608.]
630. **CEDEMIA AMERICANA** SW. & RICH.  
American Scoter. [604.]
- [631.] **MELANETTA FUSCA** (LINN.) BOIE.  
Velvet Scoter.
632. **MELANETTA VELVETINA** (CASS.) BAIRD.  
American Velvet Scoter. [601.]
633. **PELIONETTA PERSPICILLATA** (LINN.) KAUP.  
Surf Duck. [602.]
634. **ERISMATURA RUBIDA** (WILS.) BP.  
Ruddy Duck. [609.]
635. **NOMONYX DOMINICUS** (LINN.) RIDGW.  
Black Masked Duck. [610.]
636. **MERGUS MERGANSER AMERICANUS** (CASS.) RIDGW.  
American Sheldrake. [611.]
637. **MERGUS SERRATOR** LINN.  
Red-breasted Sheldrake. [612.]
638. **LOPHODYTES CUCULLATUS** (LINN.) REICH.  
Hooded Sheldrake. [613.]
639. **TACHYPETES AQUILA** (LINN.) VIEILL.  
Frigate Pelican. [619.]
640. **PELECANUS ERYTHORHYNCHUS** GMEL.  
American White Pelican. [615.]
641. **PELECANUS FUSCUS** LINN.  
Brown Pelican. [616.]
642. **PHALACROCORAX CARBO** (LINN.) BP.  
Common Cormorant. [620.]
643. **PHALACROCORAX DILOPHUS** (SW. & RICH.) NUTT.  
Double-crested Cormorant. [623.]
- 643 a. **PHALACROCORAX DILOPHUS FLORIDANUS** (AUD.) RIDGW.  
Florida Cormorant. [624.]
- 643 b. **PHALACROCORAX DILOPHUS CINCINNATUS** (BRANDT) RIDGW.  
White-crested Cormorant. [622.]
644. **PHALACROCORAX MEXICANUS** (BRANDT) RIDGW.  
Mexican Cormorant. [625.]

645. *PHALACROCORAX PENICILLATUS* (BRANDT) HEERM.  
Brandt's Cormorant. [626.]
646. *PHALACROCORAX VIOLACEUS* (GMEL.) RIDGW.  
Violet-green Cormorant. [627.]
- 646a. *PHALACROCORAX VIOLACEUS RESPLENDENS* (AUD.) RIDGW.  
Baird's Cormorant.
647. *PHALACROCORAX BICRISTATUS* PALL.  
Red-faced Cormorant.
648. *PHALACROCORAX PERSPICILLATUS* PALL.  
Pallas's Cormorant. [621.]
649. *PLOTUS ANHINGA* LINN.  
American Anhinga; Snake Bird. [628.]
650. *SULA BASSANA* (LINN.) BRISS.  
Gannet. [617.]
651. *SULA CYANOPS* SUNDEV.  
Blue-faced Gannet.
652. *SULA LEUCOGASTRA* (BODD.) SALV.  
Booby Gannet. [618.]
653. *SULA PISCATOR* (LINN.) BP.  
Red-footed Booby.
654. *PHAËTHON FLAVIROSTRIS* BRANDT.  
Yellow-billed Tropic Bird. [629.]
655. *PHAËTHON ÆTHEREUS* LINN.  
Red-billed Tropic Bird.
656. *RHYNCHOPS NIGRA* LINN.  
Black Skimmer. [697.]
657. *PAGOPHILA EBURNEA* (PHIPPS) KAUP.  
Ivory Gull. [676, 677.]
658. *RISSA TRIDACTYLA* (LINN.) BP.  
Kittiwake Gull. [672.]
- 658a. *RISSA TRIDACTYLA KOTZBUEI* (BP.) COUES.  
Pacific Kittiwake.
659. *RISSA BREVIROSTRIS* BRANDT.  
Red-legged Kittiwake. [674, 675.]
660. *LARUS GLAUCUS* BRÜNN.  
Glaucous Gull; Burgomaster. [656.]
661. *LARUS LEUCOPTERUS* FABER.  
White-winged Gull. [658.]
662. *LARUS GLAUDESCENS* LICHT.  
Glaucous-winged Gull. [657, 659.]

663. **LARUS MARINUS** LINN.  
Great Black-backed Gull. [660.]
664. **LARUS OCCIDENTALIS** AUD.  
Western Gull. [662.]
- [665.] **LARUS AFFINIS** REINH.  
Siberian Gull.
666. **LARUS ARGENTATUS** BRÜNN.  
Herring Gull.
- 666*a*. **LARUS ARGENTATUS SMITHSONIANUS** COUES.  
American Herring Gull. [661.]
667. **LARUS CACHINNANS** PALL.  
Pallas's Herring Gull.
668. **LARUS CALIFORNICUS** LAWR.  
Californian Gull. [663.]
669. **LARUS DELAWARENSIS** ORD.  
Ring-billed Gull. [664.]
670. **LARUS BRACHYRHYNCHUS** RICH.  
Short-billed Gull. [664*a*, 665, 673.]
- [671.] **LARUS CANUS** LINN.  
Mew Gull.
672. **LARUS HEERMANNI** CASS.  
Heermann's Gull. [666.]
673. **LARUS ATRICILLA** LINN.  
Laughing Gull. [667.]
674. **LARUS FRANKLINI** SW. & RICH.  
Franklin's Gull. [668, 669.]
675. **LARUS PHILADELPHIÆ** (ORD) GRAY.  
Bonaparte's Gull. [670.]
676. **RHODOSTETHIA ROSEA** (MACGILL.) BRUCH.  
Ross's Gull. [678.]
677. **XEMA SABINEI** (J. SABINE) LEACH.  
Sabine's Gull. [680.]
678. **CREAGRUS FURCATUS** (NEB.) BP.  
Swallow-tailed Gull. [679.]
679. **STERNA ANGLICA** MONTAG.  
Gull-billed Tern. [681.]
680. **STERNA CASPIA** PALL.  
Caspian Tern. [682.]
681. **STERNA REGIA** GAMB.  
Royal Tern. [683.]



682. **STERNA ELEGANS** GAMB.  
Elegant Tern. [684.]
683. **STERNA CANTIACA ACUFLAVIDA** (CABOT) RIDGW.  
Cabot's Tern. [685.]
684. **STERNA TRUDEAUI** AUD.  
Trudeau's Tern. [687.]
685. **STERNA FORSTERI** NUTT.  
Forster's Tern. [691, 686.]
686. **STERNA FLUVIATILIS** NAUM.  
Common Tern. [689.]
687. **STERNA MACRURA** NAUM.  
Arctic Tern. [690, 693.]
688. **STERNA DOUGALLI** MONTAG.  
Roseate Tern. [692.]
689. **STERNA ALEUTICA** BAIRD.  
Aleutian Tern.
690. **STERNA ANTILLARUM** (LESS.) COUES.  
Least Tern. [694.]
691. **STERNA FULIGINOSA** GMEL.  
Sooty Tern. [688.]
692. **STERNA ANÆSTHETA** SCOP.  
Bridled Tern.
693. **HYDROCHELIDON LARIFORMIS SURINAMENSIS** (GMEL.) RIDGW.  
Black Tern. [695.]
- [694.] **HYDROCHELIDON LEUCOPTERA** (WEISN. & SCHINZ) BOIE.  
White-winged Black Tern.
695. **ANOUS STOLIDUS** LINN.  
Noddy Tern. [696.]
696. **MEGALESTRIS SKUA** (BRÜNN.) RIDGW.  
Skua Gull. [652.]
697. **STERCORARIUS POMATORHINUS** (TEMML.) VIEILL.  
Pomarine Jaeger. [653.]
698. **STERCORARIUS PARASITICUS** (LINN.) SCHÆFF.  
Richardson's Jaeger. [654.]
699. **STERCORARIUS BUFFONI** (BOIE) COUES.  
Long-tailed Jaeger. [655.]
700. **DIOMEDEA NIGRIPES** AUD.  
Black-footed Albatross.
701. **DIOMEDEA BRACHYURA** TEMM.  
Short-tailed Albatross. [631.]

- [702.] **DIOMEDEA CULMINATA** GOULD.  
Yellow-nosed Albatross. [632.]
703. **PHŒBETRIA FULIGINOSA** (GMEL.) BP.  
Sooty Albatross. [633.]
704. **OSSIFRAGA GIGANTEA** (GM.) REICH.  
Giant Fulmar. [634.]
705. **FULMARUS GLACIALIS** (LINN.) STEPH.  
Fulmar Petrel. [635.]
- 705 a. **FULMARUS GLACIALIS PACIFICUS** (AUD.) BP.  
Pacific Fulmar. [636.]
- 705 b. **FULMARUS GLACIALIS RODGERSI** (CASS.) COUES.  
Rodger's Fulmar.
706. **PRIOCELLA TENUIROSTRIS** (AUD.) RIDGW.  
Slender-billed Fulmar. [637.]
707. **PRIOFINUS MELANURUS** (BONN.) RIDGW.  
Black-tailed Shearwater.
- [708.] **PUFFINUS KUHLII** (BOIE) BP.  
Cinereous Shearwater. [651.]
709. **PUFFINUS MAJOR** FABER.  
Greater Shearwater. [647.]
710. **PUFFINUS CREATOPUS** COOPER.  
Pink-footed Shearwater.
- [711.] **PUFFINUS ANGLORUM** TEMM.  
Manx Shearwater. [649.]
712. **PUFFINUS AUDUBONII** FINSCH.  
Dusky Shearwater. [650.]
713. **PUFFINUS GAVIA** (FORST.) FINSCH.  
Black-vented Shearwater.
714. **PUFFINUS FULIGINOSUS** STRICKL.  
Sooty Shearwater. [648.]
715. **PUFFINUS GRISEUS** (GM.) FINSCH.  
Dark-bodied Shearwater.
716. **PUFFINUS TENUIROSTRIS** TEMM.  
Slender-billed Shearwater.
717. **CESTRELATA HÆSITATA** (TEMML.) COUES.  
Black-capped Petrel. [638.]
- [718.] **CESTRELATA BULWERI** (JARD. & SELBY) COUES.  
Bulwer's Petrel.
- [719.] **DAPTION CAPENSIS** (LINN.) STEPH.  
Pintado Petrel; Cape Pigeon. [639.]

720. **HALOCYPTENA MICROSOMA** COUES.  
Least Petrel.
721. **PROCELLARIA PELAGICA** LINN.  
Stormy Petrel; Mother Carey's Chicken. [645.]
722. **OCEANITES OCEANICA** (KÜHL) COUES.  
Wilson's Petrel. [644.]
723. **CYMOCHOREA LEUCORRHOA** (VIEILL.) COUES.  
Leach's Petrel. [642.]
724. **CYMOCHOREA MELANIA** (BP.) COUES.  
Black Petrel. [643.]
725. **CYMOCHOREA HOMOCHROA** COUES.  
Ashy Petrel.
726. **OCEANODROMA FURCATA** (GMEL.) BP.  
Fork-tailed Petrel. [640.]
727. **OCEANODROMA HORNBYI** (GRAY) BP.  
Hornby's Petrel. [641.]
728. **FREGETTA GRALLARIA** (VIEILL.) BP.  
White-bellied Petrel. [646.]
729. **ÆCHMOPHORUS OCCIDENTALIS** (LAWR.) COUES.  
Western Grebe. [704.]
730. **ÆCHMOPHORUS CLARKII** (LAWR.) COUES.  
Clark's Grebe. [705.]
731. **PODICEPS HOLBÖLLI** REINH.  
American Red-necked Grebe. [702, 703a.]
732. **DYTES CORNUTUS** (GM.) KAUP.  
Horned Grebe. [706.]
- [733.] **DYTES AURITUS** (LINN.) RIDGW.  
Eared Grebe. [708.]
- 733a. **DYTES AURITUS CALIFORNICUS** (LAWR.) RIDGW.  
American Eared Grebe. [707.]
734. **TACHYBAPTES DOMINICUS** (LINN.) COUES.  
St. Domingo Grebe. [708a.]
735. **PODILYMBUS PODICEPS** (LINN.) LAWR.  
Thick-billed Grebe. [709.]
736. **COLYMBUS TORQUATUS** BRÜNN.  
Loon. [698.]
737. **COLYMBUS ADAMSI** GRAY.  
Great White-billed Loon.
738. **COLYMBUS ARCTICUS** LINN.  
Black-throated Diver. [699.]

739. **COLYMBUS PACIFICUS** LAWR.  
Pacific Diver. [700.]
740. **COLYMBUS SEPTENTRIONALIS** LINN.  
Red-throated Diver. [701.]
741. **ALCA IMPENNIS** LINN.  
Great Auk. [710.]
742. **UTAMANIA TORDA** (LINN.) LEACH.  
Razor-billed Auk. [711.]
743. **FRATERCULA ARCTICA** (LINN.) STEPH.  
Common Puffin. [715, 716.]
- 743a. **FRATERCULA ARCTICA GLACIALIS** (LEACH) RIDGW.  
Large-billed Puffin. [714.]
744. **FRATERCULA CORNICULATA** (NAUM.) GRAY.  
Horned Puffin. [713.]
745. **LUNDA CIRRHATA** PALL.  
Tufted Puffin. [712.]
746. **CERATORHINA MONOCERATA** (PALL.) CASS.  
Horn-billed Puffin. [717, 718.]
747. **PHALERIS PSITTACULA** (PALL.) TEMM.  
Parrot Auk. [725.]
748. **SIMORHYNCHUS CRISTATELLUS** (PALL.) MERREM.  
Crested Auk. [719, 720.]
749. **SIMORHYNCHUS PYGMÆUS** (GMEL.) RIDGW.  
Whiskered Auk. [721.]
750. **CICERONIA PUSILLA** (PALL.) RIDGW.  
Least Auk. [722, 723.]
751. **PTYCORHAMPHUS ALEUTICUS** (PALL.) BRANDT.  
Cassin's Auk. [724.]
752. **ALLE NIGRICANS** LINK.  
Sea Dove; Dovekie. [738.]
753. **SYNTHLIBORHAMPHUS ANTIQUUS** (GM.) COUES.  
Black-throated Guillemot. [736.]
754. **SYNTHLIBORHAMPHUS WURMIZUSUME** (TEMME.) COUES.  
Temminck's Guillemot. [737.]
755. **BRACHYRAMPHUS MARMORATUS** (GM.) BRANDT.  
Marbled Guillemot. [732, 733.]
756. **BRACHYRAMPHUS KITTLITZI** BRANDT.  
Kittlitz's Guillemot. [735.]
757. **BRACHYRAMPHUS HYPOLEUCUS** XANTUS.  
Xantus's Guillemot.

758. **BRACHYRHAMPHUS CRAVERI** (SALVAD.) COUES.  
Craver's Guillemot.
759. **BRACHYRHAMPHUS BRACHYPTERUS** BRANDT.  
Short-winged Guillemot. [734.]
760. **URIA GRYLLE** (LINN.) BRÜNN.  
Black Guillemot. [726.]
761. **URIA COLUMBA** (PALL.) CASS.  
Pigeon Guillemot. [727.]
762. **URIA CARBO** (PALL.) GRAY.  
Sooty Guillemot. [728.]
763. **LOMVIA TROILE** (LINN.) BRANDT.  
Common Guillemot. [729, 730.]
- 763 *a.* **LOMVIA TROILE CALIFORNICA** (BRYANT) COUES.  
California Guillemot.
764. **LOMVIA ARRA** (PALL.) BP.  
Thick-billed Guillemot.
- 764 *a.* **LOMVIA ARRA BRUNNICHII** (SCH.) RIDGW.  
Brunnich's Guillemot. [731.]



## APPENDIX.

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The following tables are intended as a condensed analysis of the changes which have taken place in North American ornithology since 1859, with other items of interest in the same connection.

### *a. Species eliminated from the catalogue of 1859.*

Catalogue No.

4. CATHARTES BURROVIANUS, Cassin *Not North American?*
6. FALCO NIGRICEPS, Cassin = No. 414.
16. ACCIPITER MEXICANUS, Swains. = No. 431.
19. BUTEO BAIRDII, Hoy = No. 442, *young*.
21. BUTEO INSIGNATUS, Cassin = No. 442, *melanistic*.
24. BUTEO MONTANUS, Nuttall = No. 436*b*, *lighter phase*.
28. BUTEO OXYPTERUS, Cassin = No. 442, *young*.
30. ARCHIBUTEO LAGOPUS, Gray = No. 447, *light phase*.
40. HALIAETUS PELAGICUS, Siebold. *Not North American*.
41. HALIAETUS WASHINGTONII, Jard. = No. 451, *young female*.
56. NYCTALE ALBIFRONS, Cassin = No. 401, *young*.
59. ATHENE CUNICULARIA, Bon. The true *cunicularia* is a South American form.\*
66. CROTOPHAGA RUGIROSTRIS, Sw. = No. 389.
73. CAMPEPHILUS IMPERIALIS, Gray. *Not North American*.
88. SPHYROPICUS WILLIAMSONII, Baird = No. 370, *adult male*.
100. LAMPORNIS MANGO, Swains. *Not North American*. [= *L. violicauda* (Bodl.) Ell.]
129. TYRANNUS MELANCHOLICUS, Vieill. *Not North American*.
- 167*a*. Var. MNIOTILTA LONGIROSTRIS, Baird.†
171. GEOTHLYPIS VELATUS, Cab. *Not North American*.
215. MYIODIOCTES BONAPARTEI, Aud. = No. 127, *young*.
239. COLLYRIO ELEGANS, Baird. An Asiatic species (*Lanius lahtora*, Sykes.).
242. VIREO VIRESCENS, Vieill. = No. 135?
- 253*a*. Var. MIMUS CAUDATUS, Baird. Not separable from *polyglottus*.
- 259*a*. HARPORHYNCHUS VETULA, Baird = No. 15.
- 261*a*. HARPORHYNCHUS LONGICAUDA, Baird. Scarcely separable from *rufus*.
272. TROGLODYTES AMERICANUS, Aud. = No. 63.
- 289*a*. Var. PARUS ALBESCENS, Baird = No. 41*a*.
309. CARPODacus HAEMORRHOUS, Wagl. *Not North American?*
311. CHRYSOMITRIS STANLEYI, Bonap. *Not North American*. [= *C. BARBATA* (Mol.).]
312. CHRYSOMITRIS YARRELLI, Bonap. *Not North American*.
324. LEUCOSTICTE ARCTOUS, Bonap. No sufficient evidence of occurrence in North America.
329. PLECTROPHANES MELANOMUS, Baird = No. 189.
365. MELOSPIZA GOULDII, Baird = No. 231*e*.
405. TRUPIALIS MILITARIS, Bonap. *Not North American*.

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\* There appears to be but a single race inhabiting North America.

† While there is undoubtedly a very appreciable difference between specimens of *M. varia* from the West Indies and those from the interior of Eastern North America in the length of the bill, it is the small-billed form which should receive a new name, since Linnaeus's name *varia* was based upon the bird of the South Atlantic States and West Indies. If to be regarded as separable, the name *borealis*, Nutt., may be applied to the western birds.

Catalogue No.

424. *CORVUS CACALOTL*, Wagl. = No. 280.  
 470. *LAGOPUS AMERICANUS*, Aud. = No. 475.  
 482. *DEMIEGRETTEA PEALII*, Baird = No. 491, *white phase*.  
 486a. *HERODIAS EGRETTE* v. *CALIFORNICA* = No. 489.  
 488. *ARDEA WURDEMANNI*, Baird = No. 486, *colored phase*.  
 494. *BUTORIDES BRUNNESCENS*, Baird. *Not North American*.  
 514. *HAEMATOPUS ATER*, Vieillot. *Not North American*.  
 563. *ANSER FRONTALIS*, Baird = No. 593a, *young*.  
 603. *PELIONETTA TROWBRIDGII*, Baird = No. 633.  
 605. *OIDEA BIMACULATA*, Baird = No. 632, *young*.  
 630. *DIOMEDEA EXULANS*, Linn. *Not North American*.  
 659. *LARUS CHALCOPTEUS*, Lawr. = No. 662.  
 665. *LARUS SUCKLEYI*, Lawr. = No. 670, *young*.  
 669. *CHROICOCEPHALUS CUCULLATUS*, Br. = No. 674, *young, second year*.  
 671. *CHROICOCEPHALUS MINUTUS*, Bruch. *Not North American*.  
 673. *RISSA SEPTENTRIONALIS*, Lawr. = No. 670, *adult*.  
 675. *RISSA NIVEA*, Bruch = No. 659.  
 677. *PAGOPHILA BRACHYTARSI*, Hölb. = No. 657.  
 686. *STERNA HAVELLI*, Aud. = No. 685, *winter plumage*.  
 693. *STERNA PIKEI*, Lawr. = No. 687, *young*.  
 703. *PODICEPS CRISTATUS*, Lath. *Not North American?*  
 703a. *PODICEPS COOPERI*, Lawr. = No. 731, *young*.  
 716. *SAGMATORHINA LABRADORIA*, Cas. = No. 745, *young*.  
 718. *CERORHINA SUCKLEYI*, Cassin = No. 746, *young*.  
 720. *PHALERIS TETRACULA*, Stephens = No. 748, *winter dress*.  
 722. *PHALERIS MICROCEROS*, Brandt = No. 750, *summer dress*.  
 730. *URIA RINGVIA*, Brünnich = No. 763, *individual phase*.  
 733. *BRACHYRHAMPHUS WRANGELII*, Br. = No. 755, *winter dress*.

Seven of the above are included in Coes's "Check List of North American Birds" (1873), viz, numbers 88, 100, 309, 488, 563a, 603, 693, and 703; the equivalent numbers of the "Check List" being, respectively, 305, 274, 411a, 450, 480a, 518a, 568, and 609—some of them bearing a different name from that given in the Smithsonian catalogue. Besides the foregoing, there are given in the "Check List" the following untenable names:

- 146a. *ÆGITHUS LINARIA* (L.) Cab. *var. FUSCESCENS*, Cs. = No. 179, *midsummer dress*.  
 157bis. *CENTRONYX OCHROCEPHALUS*, Aiken = No. 191, *autumnal plumage*.  
 [187.] *PASSER DOMESTICUS*, Linn. *An introduced species*.  
 215a. *ICTERUS SPURIUS* (L.) Bp. *var. AFFINIS*, Lawr. *Not separable from I. spurius*.  
 [283.] *AGYTRIA LINNÆI* (Bp.) —. *Not North American*. [= *A. tobaci* (Gm.) Ell.]  
 374a. *CHALEPELIA PASSERINA* (L.) Sw. *var. PALLESCENS*, (Bd.) Cs. *Untenable race*.  
 445ter [appendix]. *IBIS THALASSINUS*, Ridg. = No. 504, *young*.

*b. Species and races described or added to the North American fauna since 1859.\**

6. *Turdus iliacus*, Linn.—*Cf. REINHARDT, Ibis, 1861, 6. (Greenland; two examples.)*  
 7a. *MERULA MIGRATORIA PROPINQUA*, Ridgw.—*Turdus migratorius propinquas*, Bull. Nutt. Orn. Club, ii. Jan. 1877, 9. (Western U. S.)  
 8. *MERULA CONFINIS*, Baird.—*Turdus confinis*, Review Am. B. i. 1864, 29. (Todos Santos, Cape St. Lucas.)  
 14. *HARPORHYNCHUS CINEREUS*, Xantus.—Proc. Philad. Acad. 1859, 298. (Cape St. Lucas.)  
 14a. *HARPORHYNCHUS CINEREUS BENDIREI*, Coues.—Am. Nat. vii. June, 1873, 330, fig. 69. (Tucson, Arizona; C. Bendire.)

\* The new forms are in small capitals, the other additions in italics. In order to reduce the number of references to a minimum, only the original description, or the first North American record of a species is given. In some cases we have not been able to quote the first reference, but have done so whenever practicable.

Catalogue No.

- 15a. *HARPORHYNCHUS CURVIROSTRIS PALMERI*, Ridgw.—*H. curvirostris*, var. *palmeri*, Ridgw. in Cones's Key, 1872, 351. (Arizona.)
18. *HARPORHYNCHUS GRAYSONI*, Baird.—*Cf.* LAW. Ann. Lyc. N. Y. x. Feb. 1871, —. (Socorro I.)
20. *Cyanocitta stelleri* (Linn.) Brehm.—*Cf.* ADAMS, Ibis, 1878, 422. (St. Michael's, Alaska; seven examples.)
31. *REGULUS OBSCURUS*, Ridgw.—*R. calendula obscurus*, Bull. U. S. Geol. & Geog. Surv. Terr. ii. No. 2, Apr. 1, 1876, 184. (Guadalupe I., Lower California.)
- 33a. *REGULUS SATRAPA OLIVACEUS*, Baird.—*R. satrapa*, var. *olivaceus*, Baird, Review Am. Birds, i. July, 1864, 65 (in text). (Western United States.)
34. *Phylloscopus borealis* (Blas.) Dress.—*Phyllopneuste kennerlyi*, Baird, Trans. Chicago Acad. i. 1869, 313, pl. 30, fig. 2. (St. Michael's, Alaska.)
44. *Parus cinctus*, Bodd.—*P. sibiricus* (Gm.) Ridgw. Bull. Nutt. Orn. Club, ii. Jan. 1878, 37. (St. Michael's, Alaska; L. M. Turner.)
- 46a. *PARUS RUFESCENS NEGLECTUS*, Ridgw.—*P. rufescens*, β, *neglectus*, Proc. U. S. Nat. Mus. i. Apr. 25, 1879, 485. (Coast California.)
57. *CAMPYLORHYNCHUS AFFINIS*, Xantus.—Proc. Philad. Acad. 1859, 298. (Cape St. Lucas.)
- 58a. *SALPINCTES OBSOLETUS GUADALUPENSIS*, Ridgw.—Bull. U. S. Geol. & Geog. Surv. Terr. ii. No. 2, Apr. 1, 1876, 185. (Guadalupe I., Lower California.)
- 59a. *CATHERPES MEXICANUS CONSPERSUS*, Ridgw.—*C. mexicanus*, var. *conspersus*, Ridgw. Am. Nat. Oct. 1873, 602. (Middle Province of U. S.)
- 60b. *THRYOTHORUS LUDOVICIANUS MIAMENSIS*, Ridgw.—*T. ludovicianus* (Lath.) var. *miamensis*, Am. Nat. ix. Aug. 1875, 469. (Miami River, E. Florida.)
- 61a. *THRYOMANES BEWICKI SPILURUS* (Vig.) Baird.—Review Am. Birds, i. 1864, 126. (Pacific slope of United States.)
- 61b. *THRYOMANES BEWICKI LEUCOGASTER*, Baird.—Review Am. B. i. 1864, 127. (Southern border of U. S.)
62. *THRYOMANES BREVICAUDA*, Ridgw.—Bull. U. S. Geol. & Geog. Surv. Terr. ii. No. 2, Apr. 1, 1876, 186. (Guadalupe I., Lower California.)
64. *TROGLODYTES INSULARIS*, Baird.—*Cf.* LAW. Ann. Lyc. N. Y. x. Feb. 1871, 3. (Socorro I.)
- 65a. *ANORTHURA TROGLODYTES PACIFICUS*, Baird.—*T. hyemalis*, var. *pacificus*, Review Am. B. i. 1864, 145. (Pacific coast U. S.)
66. *ANORTHURA ALASCENSIS*, Baird.—*Troglodytes alascensis*, Trans. Chicago Acad. i. 1869, 315, pl. 30, fig. 3. (St. George's Island, Alaska; W. H. Dall.)
- 67a. *TELMATODYTES PALUSTRIS PALUDICOLA*, Baird.—*Cistothorus palustris*, var. *paludicola*, Review Am. B. i. 1864, 148. (Pacific coast U. S.)
69. *Motacilla alba*, Linn.—*Cf.* REINHARDT, Ibis, 1861, 6. (Greenland.)
70. *Budytes flava* (Linn.) Gray.—*Cf.* BAIRD, Trans. Chicago Ac. i. 1869, 3, pl. 30, fig. 1. (St. Michael's, Alaska; Pease & Bannister.)
72. *Anthus pratensis* (Linn.) Bechst.—*Cf.* PAULSEN, ed. Hölbboll, Faun. Grönl. 1846, 24; REINH. Ibis, 1861, 6 (Greenland); B. B. & R. Hist. N. Am. B. i. 1874, 173. (St. Michael's, Alaska.)
- 74a. *Mniotilta varia borealis* (Nutt.) Ridgw. [See p. 213, foot-note.]
80. *HELMINTHOPHAGA LAWRENCEI*, Herrick.—Proc. Philad. Acad. 1874, 220, pl. xv. (New Jersey.)
82. *HELMINTHOPHAGA LEUCOBONCHIALIS*, Brewster.—Am. Sportsman, v. Oct., 1874; Bull. Nutt. Orn. Club, i. 1876, 1, plate. (Massachusetts.)
83. *HELMINTHOPHAGA LUCLE*, Cooper.—Proc. Calif. Acad. Sci. July, 1861, 120. (Ft. Mojave, California.)
- 86a. *HELMINTHOPHAGA CELATA LUTESCENS*, Ridgw.—*H. celata*, var. *lutescens*, Ridgw. Am. Jour. Sci. & Arts, third ser. iv. Dec. 1872, 457. (Pacific coast U. S.)
89. *PARULA PITIAYUMI INSULARIS* (Lawr.) Ridgw.—*Parula insularis*, LAW. Ann. Lyc. N. Y. x. Feb. 1871. (Socorro I., N. W. Mexico.)

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- 89a. *PARULA PITIAYUMI NIGRILORA*, Cones.—*P. nigrilora*, Bull. U. S. Geol. & Geog. Surv. Terr. iv. 1878, 11. (Hidalgo, Texas; G. B. Semmett.)
92. *Peucedramus olivaceus* (Giraud) Cones.—*Sylvia olivacea*, Giraud, Texan Birds, 1841, 14, pl. vii. fig. 2. ("Texas.")—*Dendroica olivacea*, HENSII. Am. Sportsman, v. 328, Feb. 20, 1875; Orn. Wheeler's Exp. 1875, 202. (S. Arizona.)
- 103a. *DENDROECA DOMINICA ALBILORA*, Baird.—*D. Dominica*, var. *albilora*, Am. Nat. vii. Oct. 1873, 605. (Mississippi Valley, south to Guatemala and Honduras.)
104. *DENDROECA GRACILÆ*, Cones.—*Cf.* BAIRD, Review Am. B. i. 1864, 210. (Ft. Whipple, Arizona; Cones.)
106. *DENDROECA CHRYSOPARIA*, ScL. & Salv.—*Cf.* BAIRD, Review Am. B. i. 1864, 185, foot-note. (San Antonio, Texas; Heermann.)
- 113a. *DENDROECA PALMARUM HYPOCHURYSEA*, Ridgw.—Bull. Nutt. Orn. Club, Nov. 1876, 84, 85. (Atlantic States.)
- 116a. *SIURUS NÆVIUS NOTABILIS*, Grinnell.—*Cf.* RIDGW. Proc. U. S. Nat. Mus. iii. March 27, 1880, 12. (Black Hills, Wyoming.)
- 125a. *WILSONIA PUSILLA PILEOLATA* (Pall.) Ridgw.—*Myiodioctes pusillus*, var. *pileolata*, RIDGW. Am. Jour. Sci. & Arts, iv. Dec. 1872, 457; Am. Nat. vii. Oct. 1873, 607. (Pacific coast N. Am.)
131. *Cardellina rubrifrons* (Giraud) ScL.—*Muscicapa rubrifrons*, Giraud, Texan Birds, 1841, pl. vii. fig. 1. ("Texas.")—*Cardellina rubrifrons*, Henshaw, Orn. Wheeler's Exp. 1875, 211. (Arizona.)
133. *Basileuterus culicivorus* (Licht.) Bp.—*Muscicapa brasieri*, Giraud, Texan Birds, 1841, pl. vi. fig. 2.
134. *Basileuterus belli* (Giraud) ScL.—*Muscicapa belli*, Giraud, Texan Birds, 1841, pl. iv. fig. 1.
- 139a. *VIREOSYLVA GILVA SWAINSONI*, Baird.—*Vireo swainsoni*, Baird, B. N. Am. 1858, 336, in text. (Pacific coast U. S.)
- 141b. *LANIVIREO SOLITARIUS PLUMBEUS* (Cones) Allen.—*Vireosylva plumbea*, Cones, Proc. Philad. Acad. 1866, 73. (Ft. Whipple, Arizona.)
146. *VIREO PUSILLUS*, Cones.—Proc. Philad. Acad. 1866, 76. (Date Creek, Arizona.)
147. *VIREO VICINIOR*, Cones.—Proc. Philad. Acad. 1866, 75. (Ft. Whipple, Arizona.)
- 149b. *LANIUS LUDOVICIANUS ROBUSTUS*, Baird.—*Collurio Ludoricianus*, var. *robustus*, Am. Nat. vii. Oct. 1873, 608. (California?)
- 164a. *PYRANGA LÆTIVA COOPERI*, Ridgw.—*Pyrranga cooperi*, Proc. Philad. Acad. 1869, 130. (S. W. United States.)
167. *PYRRHULA CASSINI*, Baird.—*P. coccinea*, var. *cassini*, Trans. Chicago Acad. i. 1869, 316, pl. 29, fig. 1. (Nulato, Alaska; W. H. Dall.)
- 170a. *Carpodacus frontalis rhodocolpus* (Caban.) Ridgw.—*Cf.* Ridgw. Am. Jour. Sci. & Arts, v. Jan. 1873, 39. (Coast of California.)
171. *CARPODACUS AMPLUS*, Ridgw.—Bull. U. S. Geol. & Geog. Surv. Terr. ii. No. 2, Apr. 1, 1876, 187. (Guadalupe I., Lower Cal.; E. Palmer.)
- 175a. *LEUCOSTICTE TEPHROCOTIS LITTORALIS* (Baird) Ridgw.—*L. littoralis*, Baird, Trans. Chicago Acad. i. 1869, 318, pl. 28, fig. 1. (Sitka, Alaska.)
176. *LEUCOSTICTE ATRATA*, Ridgw.—Am. Sportsman, July 18, 1874, 241. (Colorado; C. A. Aiken.)
177. *LEUCOSTICTE AUSTRALIS*, Allen.—*L. tephrocotis*, var. *australis*, Allen. *Cf.* RIDGW. Bull. Essex Inst. v. Nov. 1873, 189. (Mt. Lincoln, Colorado.)
- 178a. *ÆGIOTHUS CANESCENS EXILIPES* (Cones) Ridgw.—*Egiothus exilipes*, CONES, Proc. Philad. Acad. Nov. 1861, 385. (Arctic America.)
- 179a. *Ægiothus linaria holbüllii* (Brehm) Ridgw.—*Linaria holbüllii*, BREHM, Vög. Deutschl.
180. *ÆGIOTHUS BREWSTERI*, Ridgw.—*Egiothus (flavirostris) brewsteri*, Ridgw. Am. Nat. July, 1872, 433. (Waltham, Mass.)
- 182a. *ASTRAGALINUS PSALTRIA ARIZONÆ* (Cones) Ridgw.—*C. mexicana*, var. *arizona*, Cones, Proc. Philad. Acad. 1866, 82. (Ft. Whipple, Arizona.)



Catalogue No.

192. *PASSERCULUS PRINCEPS*, Maynard.—Am. Nat. vi. 1872, 637. (Ipswich, Mass.)  
 195. *PASSERCULUS GUTTATUS*, Lawr.—Am. Lyc. N. Y. viii. 1867, 473 (Cape St. Lucas).  
*Cf.* COOPER, Orn. Cal. i. 1870, 185.  
 197a. *Poocetes gramineus confinis*, Baird.—*P. gramineus*, var. *confinis*, Baird, B. N. Am. 1858, 448, in text.. (Western U. S.)  
 198a. *COTURNICULUS PASSERINUS PERPALLIDUS*, Ridgw.—*C. passerinus*, var. *perpallidus*, Ridgw. in Cones's "Key", 1872, 137. (Western U. S.)  
 201a. *AMMODROMUS CAUDACUTUS NELSONI*, Allen.—Proc. Boston Soc. xvii. March, 1875, 93. (N. E. Illinois.)  
 203. *AMMODROMUS NIGRESCENS*, Ridgw.—*A. maritimus*, var. *nigrescens*, Ridgw. Bull. Essex Inst. Dec. 1873, 198. (Indian R., Florida.)  
 204a. *Chondestes grammia strigatus* (Sw.) Ridgw.

Mr. H. K. Coale, of Chicago, Ill., has lately called my attention to certain differences between eastern (typical) and western specimens of this species, which, upon examination of a large series, I find to be quite constant and sufficiently appreciable to warrant the recognition of a western race. Western birds being exactly like those from Mexico in those points in which they differ from eastern specimens, Swainson's name *strigatus* (*Chondestes strigatus*, Philos. Jour. i. 1827, 435), based upon the Mexican bird, is available for the western and southern race.

- 207a. *ZONOTRICHIA GAMBELI INTERMEDIA*, Ridgw.—*Z. leucophrys*, var. *intermedia*, RIDGW. Bull. Essex Inst. Dec. 1873, 198. (Middle Province of U. S., north to Alaska.)  
 211a. *SPIZELLA SOCIALIS ARIZONÆ*, Cones.—*S. socialis*, var. *arizonæ*, COUES, Key, 1872, 143. (Ft. Whipple, Arizona.)  
 216. *JUNCO AIKENI*, Ridgw.—*J. hyemalis*, var. *Aikeni*, RIDGW. Am. Nat. Oct. 1873, 612, 614. (Mts. of Colorado; C. E. Aiken.)  
 219. *JUNCO ANNECTENS*, Baird.—Orn. Cal. i. 1870, 564. (Rocky Mts., Ft. Bridger to Arizona and New Mexico.)  
 223. *JUNCO INSULARIS*, Ridgw.—Bull. U. S. Geol. & Geog. Surv. Terr. ii. No. 2, Apr. 1, 1876, 188. (Guadalupe I., Lower Cal.; E. Palmer.)  
 225a. *AMPHISPIZA BELLII NEVADENSIS*, Ridgw.—*Poospiza bellii*, var. *nevadensis*, Ridgw. Bull. Essex Inst. Nov. 1873, 191. (Middle Province of U. S.)  
 226a. *PEUCEEA FESTIVALIS ILLINOENSIS*, Ridgw.—*P. illinoensis*, Bull. Nutt. Orn. Club, Oct. 1879, 219. (Texas to S. Illinois.)  
 227. *PEUCEEA ARIZONÆ*, Ridgw.—*P. astivalis*, var. *Arizona*, RIDGW. Am. Nat. Oct. 1873, 615. (S. Arizona.)  
 229. *PEUCEEA CARPALIS*, Cones.—Am. Nat. vii. June, 1873, 322. (Tucson, Arizona; C. Bendire.)  
 230a. *PEUCEEA RUFICEPS BOUCARDI* (Sel.) Ridgw.—*Cf.* HENSHAW, Orn. Wheeler's Exp. 1874, 117. (S. Arizona and S. New Mexico.)  
 231d. *Melospiza fasciata guttata* (Nutt.) Ridgw.

This is the "*M. rufina*" of the old catalogue. The true *M. rufina* (Brandt) is a larger and darker form from Sitka, rediscovered since the publication of "Birds of North America" (1858).

- 231e. *Melospiza fasciata rufina* (Brandt) Ridgw.—*Cf.* B. B. & R. Hist. N. Am. B. ii. 1874, 29. (British Columbia to Sitka.)  
 232. *Melospiza cinerea* (Gmel.) Ridgw.—"*M. insignis*", BAIRD, Trans. Chicago Acad. i. 1869, 319, pl. 29, fig. 2. (Kadiak, Alaska; F. Bisehoff.)  
 237a. *PIPILO ERYTHROPHthalmus ALLENI*, Cones.—*P. alleni*, COUES, Am. Nat. v. Aug. 1871, 366. (Florida.)  
 238c. *PIPILO MACULATUS CONSOBRINUS*, Ridgw.—Bull. U. S. Geol. & Geog. Surv. Terr. ii. No. 2, Apr. 1, 1876, 189. (Guadalupe I., Lower Cal.)  
 238d. *PIPILO MACULATUS CARMANI* (Lawr.) Ridgw.—*Pipilo carmani*, LAWRE. Ann. Lyc. N. Y. x. 1871. 7. (Socorro I., N. W. Mexico.)



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- 240a. *PIPIO FUSCUS ALBIGULA* (Baird) Ridgw.—*P. albigula*, BAIRD, Proc. Philad. Acad. Nov. 1859, 305. (Cape St. Lucas.)
- 242a. *CARDINALIS VIRGINIANUS IGNEUS*, Baird.—*C. igneus*, BAIRD, Proc. Philad. Acad. Nov. 1859, 305. (Cape St. Lucas.)
253. *Phonipara zena* (Linn.) Bryant.—*Cf.* B. B. & R. Hist. N. Am. B. ii. 1874, 93. (Key West, Florida; H. W. Henshaw.)
- 258a. *Molothrus ater obscurus* (Gmel.) Cones.—*M. obscurus*, CASS. Proc. Philad. 1866, 18. (Lower California.)
259. *Molothrus aeneus* (Wagl.) Cab.—*Cf.* MERRILL, Bull. Nutt. Orn. Club, i. July, 1876, 88. (Ft. Brown, Texas.)
- 263a. *STURNELLA MAGNA MEXICANA* (Sel.) Ridgw.—*Cf.* BREWER, Bull. Nutt. Orn. Club, iii. July, 1878, 152. (Ft. Brown, Texas; J. C. Merrill.)
276. *Quiscalus palustris* (Swains.) Cassin.—“*Q. major*”, GAMBEL, Jour. Philad. Acad. i. 1847, 47. (Gulf of California.)\*
- 278b. *QUISCALUS VERSICOLOR AENEUS*, Ridgw.—*Q. aeneus*, Ridgw. Proc. Philad. Acad. 1839, 134. (Mississippi Valley, Hudson's Bay Terr., Maine, etc.)
- [279.] *Sturnus vulgaris*, Linn.—*Cf.* REINHARDT, Ibis, 1861, 7. (Greenland.)
- 290a. *CYANOCITTA STELLERI FRONTALIS*, Ridgw.—*Cyanura stelleri*, var. *frontalis*, RIDGW. Am. Jour. Sci. & Arts, third ser. v. Jan. 1873, 41, 43. (Sierra Nevada, California.)
- 290b. *CYANOCITTA STELLERI ANNECTENS*, Baird.—*Cyanura stelleri*, var. *annectens*, Baird, in B. B. & R. Hist. N. Am. Birds, ii. 1874, 281, in text. (Northern Rocky Mts.)
- 297a. *PERISOREUS CANADENSIS CAPITALIS*, Baird.—*P. canadensis*, var. *capitalis*, BAIRD, Bull. Essex Inst. v. Nov. 1873, 193. (Rocky Mountains.)
- 297b. *PERISOREUS CANADENSIS FUMIFRONS*, Ridgw.—Proc. U. S. Nat. Mus. iii. March 27, 1880, 5. (Coast of Alaska.)
298. *PERISOREUS OBSCURUS*, Ridgw.—*P. canadensis*, var. *obscurus*, RIDGW. Bull. Essex Inst. Nov. 1873, 194. (Northwest coast of U. S.)
- [299.] *Alanda arvensis*, Linn.—*Cf.* DRESSER & SHARPE, Birds Eur. pt. —, and B. B. & R. Hist. N. Am. B. ii. 1874, 136. (Greenland and Bermuda.)
- 300a. *FREMONTIA ALPESTRIS LEUCOLEMA*, Cones.—Birds N. W. 1874, 38. (Interior plains N. Am.)
- 300b. *Eremophila alpestris chrysolama* (Wagl.) —.—*E. cornuta*, var. *chrysolama*, BAIRD, B. N. Am. 1858, 403, in text. (Southwestern U. S.)
308. *Pitangus derbianus* (Kaup) Sel.—*P. derbianus*, COUES, The Country, July 13, 1878, 184. (Lomita, Texas; G. B. Sennett.)
309. *Myiozetetes texensis* (Girard) Sel.—*Muscicapa texensis*, GIRAUD, Texan Birds, 1841, pl. 1. (“Texas.”)
310. *Myiodinastes luteiventris*, Bonap.—*Cf.* HENSHAW, Orn. Wheeler's Exp. 1875, 346, pl. xiv. (S. Arizona.)
319. *Contopus pertinax*, Cab. & Hein.—*Cf.* COUES, Proc. Philad. Acad. 1866, 60. (Ft. Whipple, Arizona.)
329. *Empidonax fulvifrons* (Girard) Sel.—*Muscicapa fulvifrons*, GIRAUD, Texan Birds, 1841, pl. ii. (“Texas.”)
- 329a. *EMPIDONAX FULVIFRONS PALLESCENS* (Cones) Ridgw.—*Mitrephorus pallescens*, COUES, Proc. Philad. Acad. 1866, 63. (Ft. Whipple, Arizona.)
331. *Ornithion imberbe* (Sel.) Cones.—“*O. incanescens*”, COUES, The Country, July 13, 1878, 184. (Lomita, Texas; G. B. Sennett.)
334. *Eugenes fulgens* (Sw.) Gould.—*Cf.* HENSHAW, Am. Nat. Apr. 1874, 241; Orn. Wheeler's Exp. 1875, 379. (Mt. Graham, Arizona.)
341. *SELASPHORUS ALLENI*, Henshaw.—Bull. Nutt. Orn. Club, ii. 1877, 54. (Coast of California.)

\* The National Museum possesses an example of what is apparently this species from the coast of Louisiana.

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342. *Atthis heloisae* (Less. & Del.) Rich.—(Cf. ELLIOT, Illustr. Am. B. i. 1869, xxi. xii. plate. (El Paso, Texas; J. H. Clarke.)
343. *Stellula calliope*, Gould.—*Calothorax calliope*, XANTUS, Proc. Philad. Acad. 1859, 190. (Ft. Tejon, Cal.)
344. *Calothorax lucifer* (Sw.) Gray.—“*Doricha euicura*”, HENSIL. Am. Sportsman, v. 328, Feb. 20, 1875; Orn. Wheeler's Exp. 1875, 381. Cf. LAWR. Bull. Nutt. Orn. Club, ii. Oct. 1877, 108. (Camp Bowie, Arizona.)
345. *Amazilia fuscicaudata* (Fras.) Ridgw.—“*Pyropharna ricferi*”, MERRILL, Bull. Nutt. Orn. Club, i. Oct. 1876, 88. (Ft. Brown, Texas.) Cf. RIDGW. Proc. U. S. Nat. Mus. i. 1878, 147 (synonymy and diagnosis).
346. *Amazilia yucatanensis* (Cabot) Gould.—“*A. cervineiventris*”, MERRILL, Bull. Nutt. Orn. Club, ii. Jan. 1877, 26. (Ft. Brown, Texas.) Cf. RIDGW. Proc. U. S. Nat. Mus. i. 1878, 148 (synonymy and diagnosis).
347. *BASILINNA XANTUSI* (Lawr.) Elliot.—*Amazilia xantusi*, LAWR. Ann. N. Y. Lye. vii. April, 1860, 109 (= ♀).—*Heliopectica castanocauda*, LAWR. t. c. 145 (= ♂). (Cape St. Lucas.)
348. *Iuche latirostris* (Sw.) Elliot.—*Circe latirostris*, HENSIL. Am. Sportsman, v. Feb. 20, 1875; Orn. Wheeler's Exp. 1875, 380. (Chiricahua Mts., S. Arizona.)
- 357b. *Chordeiles popetue minor* (Cab.) Ridgw.—Cf. B. B. & R. Hist. N. Am. B. iii. 1874, 520. (Miami, Florida; C. J. Maynard.)
- 360a. *Picus villosus leucomelas* (Bodd.) Ridgw.—*Picus leucomelas*, Bodd. Tabl. P. E. 1783 (ex. Pl. Enum. 345, fig. 1 = ♀ ad.).
- 363a. *PICUS SCALARIS LUCASIANUS* (Xant.) Coues.—*P. lucasianus*, XANTUS, Proc. Philad. Acad. 1859, 293, 302. (Cape St. Lucas.)
365. *Picus stricklandi*, Muhl.—Cf. HENSHAW, Am. Sportsman, v. 328, Feb. 20, 1875; Orn. Wheeler's Exp. 1875, 380. (S. Arizona.)
- 377a. *MELANERPES FORMICIVORUS ANGUSTIFRONS*, Baird.—*M. formicivorus*, var. *angustifrons*, BAIRD, Orn. Cal. i. 1870, 405. (Cape St. Lucas.)
380. *COLAPTES RUFIPILEUS*, Ridgw.—*C. mexicanus rufipileus*, Bull. Geog. & Geol. Surv. Terr. ii. No. 2, Apr. 1, 1876, 191. (Guadalupe I., Lower Cal.)
390. *Crotophaga sulcirostris*, Swains.—Cf. COUES, The Country, July 13, 1878, 184. (Lomita, Texas; G. B. Sennett.)
393. *CONCURS HOLOCHLORUS BRIVIPES*, Baird.—*Conarus holochlorus*, var. *brivipes*, “Baird, MS.”, LAWR. Ann. Lye. N. Y. x. 1871, —. (Socorro I.)
- 397a. *STRIX NEBULOSA ALLENI*, Ridgw.—Proc. U. S. Nat. Mus. iii. March 27, 1880, —. (Clearwater, S. Florida.)
398. *STRIX OCCIDENTALIS* (Xant.) Ridgw.—*Syrnium occidentale*, XANTUS, Proc. Philad. Acad. 1859, 193. (Ft. Tejon, Cal.)
- 399a. *Ulula cinerea lapponica* (Retz.) Ridgw.—*Syrnium lapponicum*, RIDGW. Bull. Nutt. Orn. Club, iii. Jan. 1878, 37. (St. Michael's, Alaska; L. M. Turner.)
- 402a. *SCOPS ASIO FLORIDANUS*, Ridgw.—*S. asio*, var. *Floridanus*, RIDGW. Bull. Essex Inst. Dec. 1873, 200. (Florida.)
- 402c. *SCOPS ASIO MAXWELLII*, Ridgw.—*S. asio*, e, *maxwellii*, RIDGW. Field & Forest, June, 1877, 210, 213. (Boulder Co., Colorado.)
- 402d. *SCOPS ASIO KENNICOTTII*, (Elliot) Coues.—*S. Kennicottii*, ELLIOT, Proc. Philad. Acad. 1867, 69; Illustr. Am. B. 1869, pl. 11. (Sitka, Alaska; F. Bischoff.)
403. *Scops trichopsis*, Wagl.—“*S. asio*, var. *maccalli*”, B. B. & R. Hist. N. Am. B. iii. 1874, 52. (New Mexico.)
404. *Scops flammeolus* (Licht.) Sel.—Cf. COOPER, Orn. Cal. i. 1870, 422. (Ft. Crook, N. California.)
- 405a. *Bubo virginianus subarcticus* (Hoy) Ridgw.—*Bubo subarcticus*, Hoy, Proc. Philad. Acad. vi. 1852, 211. (Wisconsin.) [=“var. *arcticus*” of Hist. N. Am. B. iii. 1874, 64.]
- 405b. *Bubo virginianus arcticus* (Swains.) Cass.—*Bubo arcticus*, Swains. F. B. A. ii. 1831, 86, pl. 30. (Interior of fur countries.)

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- 405c. *BUBO VIRGINIANUS SATURATUS*, Ridgw.—Orn. 40th Parallel, 1877, 572, foot-note. (Northern coast N. Am.) [=“var. *pacificus*” of Hist. N. Am. B. iii. 65.]
- 407a. *Surnia funerea ulula* (Linn.) Ridgw.—*Cf.* RIDGW. Bull. Nutt. Orn. Club, iii. Jan. 1878, 38. (St. Michael's, Alaska; L. M. Turner.)
- 408a. *SPEOTYTO CUNICULARIA FLORIDANA*, Ridgw.—*S. cunicularia*, var. *floridana*, RIDGW. Am. Sportsman, iv. No. 14, July 4, 1874, 216. (Sarasota Bay, Florida.)
410. *Glaucidium phalaenoides* (Daud.) Sci. & Salv.—*G. ferrugineum* (Max.) COUES, Am. Nat. vi. 1872, 370. (Tucson, Arizona; C. Bendire.)
411. *MICRATHENE WHITNEYI* (Cooper) Cones.—*Athene whitneyi*, COOPER, Proc. Cal. Acad. Sci. ii. 1863, 118. (Ft. Mojave, S. E. California.)
- 412b. *Hierofalco gyrfalco sacer* (Forst.) Ridgw.—*F. sacer*, FORSTER, Philos. Trans. lxii. 1772, 383, 423. (Hudson's Bay Terr.)
- 412c. *Hierofalco sacer obsoletus* (Gm.) Ridgw.—*Falco obsoletus*, Gmel. S. N. i. 1788, 268. (Hudson's Bay Terr.)
- 414a. *FALCO PEREGRINUS PEALEI*, Ridgw.—*F. communis*, var. *Pealei*, RIDGW. Bull. Essex Inst. Dec. 1873, 201. (Northwest coast N. Am.)
416. *Æsalon regulus* (Pall.) Blyth.—*Falco æsalon* NEWTON, Man. Nat. Hist. Greenl. 1875, p. 96. (At sea, near Greenland, lat. 57° 41' N., long. 35° 23' W.)
- 417a. *ÆSALON COLUMBARIUS SUCKLEYI*, Ridgw.—*Falco columbarius*, var. *Suckleyi*, RIDGW. Bull. Essex Inst. v. Dec. 1873, 201. (Northwest coast N. Am.)
418. *ÆSALON RICHARDSONII*, Ridgw.—*Falco (Hypotriorchis) richardsonii*, RIDGW. Proc. Philad. Acad. Dec. 1870, 145. (Interior of North America.)
421. *Tinnunculus spurrerioides* (Vig.) Gray. (Florida.)\*
422. *Tinnunculus alaudarius* (Gm.) Gray.—*Cf.* NEWTON, Man. Nat. Hist. Greenl. 1875, 96. (Off Cape Farewell, Greenland.)
424. *POLYBORUS LUTOSUS*, Ridgw.—Bull. U. S. Geol. & Geog. Surv. Terr. No. 6, 2d ser. Feb. 8, 1876, 459. (Guadalupe I., Lower California.)
- 433a. *ASTUR ATRICAPILLUS STRIATULUS*, Ridgw.—*A. palamarius*, var. *striatulus*, Ridgw. in Hist. N. Am. B. iii. 1874, 240. (Western N. Am.)
435. *Buteo vulgaris*, Leach.—*Cf.* MAYNARD, Bull. Nutt. Orn. Club, i. No. 1, April, 1876, 2-6. (Pawpaw, Mich.)
- 436a. *BUTEO BOREALIS KRIDERI*.—“*B. borealis*, variety *krideri*,” Hoopes, Proc. Philad. Acad. 1873, 238, pl. v. (=juv.; Winnebago Co., Iowa.)
- 436c. *BUTEO BOREALIS LUCASIANUS*, Ridgw.—*B. borealis*, var. *lucasianus*, Hist. N. Am. B. iii. 1874, 258, 285. (Cape St. Lucas.)
- 436d. *BUTEO BOREALIS SOCORROENSIS*.

In the “Proceedings” of the Boston Society of Natural History, 1871, p. 42, Mr. Lawrence refers to a “*Buteo borealis*, var. *montanus*, Nutt.” as being very abundant on the island of Socorro, where it is the only species of hawk to be found, and where it is a “constant resident, rearing its young, and subsisting entirely on land crabs”, etc. In the same paper, p. 10, Mr. Lawrence applies the same name to a hawk occurring abundantly on the Tres Marias Islands, and there subsisting “entirely upon the Iguana lizard and rabbits.” In “History of North American Birds”, vol. iii, p. 285 (1874), I referred the Tres Marias bird to *Buteo borealis* var. *costaricensis*, and described our only specimen from that locality as the young of that form, although I had not, from want of specimens, been able to compare it with the corresponding age of the Central American bird. I now have strong doubts as to its being the same as *B. costaricensis*, while as to the hawk found on Socorro I regard it quite certain that it is, like the Caracara of Guadalupe (*Polyborus lutosus*), a species or race peculiar to that remote island, the birds of which are for the most part entirely local. I therefore propose to name, provisionally, the Socorro Hawk *B. borealis socorroensis*.

440. *Buteo abbreviatus*, Cabanis, in Schomb. Guiana, iii. 1848, 739.—“*B. zonocercus*, Sci.”, COOPER, Orn. Cal. i. 1870, 479. (Coast of California, near San Diego.)

\* There is a male of this species in my collection said to have been obtained in Florida. It was found with a collection of Florida birds, forming part of a dealer's stock, and was evidently the same “make” of skin as the rest of the lot.

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441. *Buteo albicaudatus* (Vieill.)—*B. albocaudatus*, COUES, The Country, i. 184, July 13, 1878. (Lomita, Texas; G. B. Sennett). Cf. RIDGW. Proc. U. S. Nat., Mus. i. Oct. 2, 1878, 154 (synonymy and descriptions).
444. *Urubitinga anthracina* (Licht.) Nitzsch.—Cf. HENSHAW, Am. Sportsman, v. 328, Feb. 20, 1875; Orn. Wheeler's Exp. 1875, 420. (Arizona.)
446. ONYCHOTES GRUBERI, Ridgw.—Proc. Philad. Acad. Dec. 1870, 149. (California.)
450. *Thrasvatus harpyia*.

According to Dr. Felix L. Oswald, in the *American Naturalist*, 1878, p. 151, a specimen of the Harpy Eagle was shot at the "delta of the Rio Grande", in Texas, by Professor S. B. Buckley, State geologist of Texas. A full account of the circumstance is given in Dr. Oswald's interesting article. I have seen somewhere a record of the occurrence of this species in Louisiana, but cannot now lay hand on the reference. According to my recollection, the record may be found in an old number of the "Proceedings" of the Philadelphia Academy of Sciences, or else of the Zoölogical Society of London.

461. ZENÆDURA GRAYSONI, Baird.—Cf. LAWRENCE, Am. Lyc. N. Y. x. 1871, 17; Proc. Boston Soc. xiv. 1871, 299. (Socorro I.)
463. *Engyptila albifrons* (Bp.) Coues.—*Echmoptila albifrons*, Coues, Bull. U. S. Geol. & Geog. Surv. Terr. iv. No. 1. 1878, 48 (South Texas); Ridgw. Proc. U. S. Nat. Mus. i. Oct. 1878, 158 (synonymy).
- 471a. CANACE OBSCURA FULIGINOSA, Ridgw.—*C. obscura*, var. *fuliginosa*, Ridgw. Bull. Essex Inst. Dec. 1873, 199. (Northwest coast, Oregon to Sitka.)
- 471b. *Canace obscura richardsonii* (Dougl.) Ridgw.—*Tetrao richardsonii*, "SABINE, MSS.", DOUGL. Linn. Trans. xvi. 1829, 141.
- 477a. CUPIDONIA CUPIDO PALLIDICINCTA, Ridgw.—*C. cupido*, var. *pallidicincta*, Ridgw. Bull. Essex Inst. Dec. 1873, 199. (Southwestern prairies.)
- 478a. *Pediocetes phasianellus columbianus* (Ord) Ridgw.—*Phasianus columbianus*, Ord, Guthrie's Geog. 2d Am. ed. ii. 1815, 317.—*Pediocetes columbianus*, ELLIOT, Pr. Ac. Nat. Sci. Philad. 1862, 403.
- 480a. ORTYX VIRGINIANA FLORIDANA, Coues.—*O. virginianus*, var. *floridanus*, COUES, Key, 1872, 237. (Florida; J. A. Allen.)
- 481a. *Oreortyx picta plumifera* (Gould) Ridgw.—*Ortyx plumifera*, Gould, P. Z. S. 1837, 42.
488. *Ardea cinerea*, Linn.—Cf. REINH. Ibis, 1861, 9. (Greenland.)
499. *Mycteria americana*, Linn.—Cf. COUES, Check List, 1873, 135. (Austin, Texas.)
506. *Hematopus ostralegus*, Linn.—Cf. REINH. Ibis, 1861, 9. (Greenland.)
512. *Fauellus cristatus* (Linn.) Meyer.—Cf. REINH. Ibis, 1861, 9. (Greenland.)
514. *Charadrius pluralis*, Linn.—Cf. NEWTON, Man. Nat. Hist. Greenl. 1875, 101. (Greenland.)
- 515a. *Charadrius dominicus fulvus* (Gmel.) Ridgw.—*C. fulvus*, COUES, Elliott's Prybilov Islands, 1875, 179; Birds N. W. 1874, 450, foot-note. (Prybilov Islands, Alaska.)
518. *Ægialitis hiaticula* (Linn.) Boie.—Cf. NEWTON, Man. Nat. Hist. Greenl. 1875, 101. (Greenland.)
519. *Ægialitis euronica* (Gmel.) Gray.—Introduced as *Æ. microrhynchus*, Ridgw., n. s., Am. Nat. viii. Feb. 1874, 109. ("San Francisco, Cal.")
- 520a. *ÆGIALITIS MELODA CIRCUMCINCTA*, Ridgw.—*Æ. melodus*, var. *circumcinctus*, Am. Nat. viii. Feb. 1874, 109. ("Plains between Missouri River and Rocky Mountains.")
524. *Scolopax rusticula*, Linn.—Cf. BAIRD, Am. Jour. Arts & Sciences, xli. May, 1866, 25. (Newfoundland.)
526. *Gallinago media*, Leach.—Cf. REINH. Ibis, 1861, 11. (Greenland.)
531. ARQUATELLA COUESII, Ridgw.—Bull. Nutt. Orn. Club, July, 1880, 160. (Aleutian islands and contiguous coast of Alaska.)
532. ARQUATELLA PTILOCNEMIS (Coues) Ridgw.—"*Tringa crassirostris*", DALL, Am. Nat. viii. 1873, 635 (St. Paul's I., Alaska).—*Tringa ptilocnemis*, COUES, Elliott's Prybilov Islands, 1875, foot-note.



## Catalogue No.

533. *Actodromas acuminata* (Horsf.) Ridgw.—Obtained at St. Michael's, Alaska, by Mr. E. W. Nelson, U. S. Signal Service.

The single example forwarded by Mr. Nelson is without date or exact locality, and I have been unable to get from him the desired information, my letter to him on the subject having doubtless miscarried. The species is so important an addition to the fauna, however, that it cannot be overlooked in the present connection, reluctant as we are to publish a note of its occurrence without being able to furnish those data from the pen of Mr. Nelson himself, which would do him full justice, as the first discoverer of this Indian species on this continent.

537. *ACTODROMAS BAIRDII*, CONES.—Proc. Philad. Acad. 1861, 194. (Arctic America.)
539. *Pelidna alpina* (Linn.) Boie.—*Tringa alpina*, NEWTON, Man. Nat. Hist. Greenl. 1875, 103. (Greenland.)
- 541a. *EREUNETES PUSILLUS OCCIDENTALIS* (LAWT.) CONES.—*E. occidentalis*, LAWR. Proc. Philad. Acad. 1864, 107. (Pacific coast U. S.)
544. *Limosa lapponica novae-zealandiae*, GRAY.—*L. uropygialis*, BAIRD, Trans. Chicago Acad. i. 1869, 320, pl. 32. (Alaska.)
546. *Limosa argocephala* (Linn.) Leach.—*Cf.* REINH. Ibis, 1861, 11. (Greenland.)
551. *Rhyacophilus oehropus* (Linn.) Ridgw.—*Cf.* BREWER, Bull. Nutt. Orn. Club, iii. Jan. 1878, 49. (Nova Scotia.)
561. *Numenius phaeopus* (Linn.) Lath.—*Cf.* REINH. Ibis, 1861, 10. (Greenland.)
562. *Numenius tahitiensis* (Gmel.) Cass.—“*Numenius femoralis*, PEALE”, RIDGW. Am. Nat. July, 1874, 435. (Kadiak, Alaska; F. Bischoff.)
568. *Parra gymnostoma*, WAGL.—*Cf.* MERRILL, Bull. Nutt. Orn. Club, i. Nov. 1876, 88 (Ft. Brown, Texas); RIDGW. Proc. U. S. Nat. Mus. i. 1878, 167, pl. iii. (synonymy and descriptions).
570. *RALLUS OBSOLETUS*, RIDGW.—*R. elegans*, var. *obsoletus*, RIDGW. Am. Nat. viii. Feb. 1874, 111. (Coast California.)
- 571a. *RALLUS LONGIROSTRIS SATURATUS*, HENSH.—*Cf.* RIDGW. Bull. Nutt. Orn. Club, July, 1880, 140. (Louisiana.)
573. *Porzana maculata* (Leach) Bp.—“*Ortygometra porzana* (Linn.)”, REINH. Ibis, 1861, 12. (Greenland.)
- 576a. *PORZANA JAMAICENSIS COTURNICULUS*, BAIRD.—*P. jamaicensis*, var. *coturniculus*, BAIRD, Am. Nat. viii. Feb. 1874, 111. (Farallone Islands, California.)
586. *Olor cygnus* (Linn.) Bp.—“*Cygnus ferus*, RAY”, REINH. Ibis, 1861, 13. (Greenland.)
587. *Olor minor* (Pall.) Bp.—“*Cygnus bewickii*”, SW. & RICH. F. B. A. ii. 1831, 465. (“Igloodik [Arctic America], lat. 66°, June 19, 1823.” Said to breed “on the sea-coast within the Arctic circle.” The description, from specimens killed at locality quoted above, is of the true *O. minor*, or Bewick's Swan.)
592. *CHEN ROSSII* (BAIRD) RIDGW.—*Anser rossii*, “BAIRD, MSS.”, CASS. Proc. Philad. Acad. 1861, 73. (Arctic America.)
593. *Anser albifrons* (Gm.) ————*Cf.* REINH. Ibis, 1861, 12. (Greenland.)
603. *ANAS FULVIGULA*, RIDGW.—*A. obscura*, var. *fulvigula*, Am. Nat. viii. Feb. 1874, 111. (Florida.)
- 627a. *SOMATERIA MOLLISSIMA DRESSERI* (Sharpe) CONES.—*S. dresseri*, SHARPE, Ann. Mag. N. H. July, 1871, 51, figs. 1, 2.

This bird has been called by all American writers *S. mollissima*. The true Eider, however, has only lately been detected in America, it being the form found by Mr. Kumlien breeding abundantly on the west side of Cumberland Gulf.

631. *Melanetta fusca* (Linn.)—*Cf.* REINHARDT, Vid. Medd. Nat. För. Kjobenhavn, 1879, 1. (South Greenland.)
- 646a. *Phalacrocorax violaceus resplendens* (Aud.) Ridgw.—*Graculus bairdii*, “GRÜBER, MSS.”, COOPER, Proc. Philad. Acad. Jan. 1865, 5. (Farallone Islands.)



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647. *Phalacrocorax bicristatus*, Pallas.—“*Graculus bicristatus*, Pallas”, Baird, Trans. Chicago Acad. i. 1869, —, pl. 33. (St. George’s I., Alaska; W. H. Dall.)
651. *Sula cyanops*, Sundev.—*Cf.* LAWRE. Proc. Boston Soc. xiv. 1871, 302. (Socorro I.)
653. *Sula piscator* (Linn.) —.—*Cf.* LAWRE. Proc. Boston Soc. xiv. 1872, 303. (Socorro I.)
655. *Phaethon ethereus*, Linn.—*Cf.* FREKE, Sci. Proc. Roy. Dubl. Soc. 1879.\* (Banks of Newfoundland, August, 1876.)
665. *Larus affinis*, Reinh.—*Vid.* Medd. Nat. För. Kjöbenhavn, 1853, 78. (Greenland.)
- 666a. *LARUS ARGENTATUS SMITHSONIANUS*, Cones.—*L. smithsonianus*, COUES, Proc. Philad. Acad. 1862, 296. (North America.)
667. *Larus cachinnans*, Pall.—“*Larus borealis*, Brandt”, BAIRD, Trans. Chicago Acad. i. 1869, 305. (St. Michael’s, Alaska; Bischoff.)
671. *Larus canus*, Linn.—*Cf.* BREWER, Bull. Nutt. Orn. Club, iii. Jan. 1878, 50. (Labrador; Cones.)
689. *STERNA ALEUTICA*, Baird.—Trans. Chicago Acad. i. 1869, 321, pl. 31, fig. 1. (Kadiak, Alaska; Bischoff.)
692. *Sterna anastheta*, Scopoli.—*Sterna (Haliplana) anastheta*, COUES, Key, 1872, 322 (Florida.)
694. *Hydrochelidon leucoptera* (Meisn.) Boie.—*Cf.* BREWER, Am. Nat. March, 1874, 188. (Lake Koshkonnong, Wisconsin; T. Kunlien.)
- 705b. *FULMARIUS GLACIALIS RODGERSI* (Cass.) Cones.—*F. rodgersii*, CASS. Proc. Philad. Acad. 1862, 290 (North Pacific); BAIRD, Trans. Chicago Acad. i. 1869, 323, pl. 34, fig. 1 (St. Georges I., Alaska).
710. *PUFFINUS CREATORIUS*, Cooper.—*Cf.* COUES, Proc. Philad. Acad. 1864, 131. (Coast California.)
713. *Puffinus gavia* (Forst.) Finsch.—*P. opisthomelas*, COUES, Proc. Philad. Acad. 1864, 139. (Coast California.)
715. *Puffinus griseus* (Gmel.) Finsch.—*Nectris amaurosoma*, COUES, Proc. Philad. Acad. 1864, 124.
716. *Puffinus tenuirostris*, Temm.—*Nectris tenuirostris*, DALL & BANNISTER, Trans. Chicago Acad. i. 1869, 303. (Kotzebue Sound.)
718. *Æstrelata bulweri* (Jard.) Gigl. & Salvad.—*Thalassidroma bulweri*, NEWTON, Man. Nat. Hist. Greenl. 1875, 108.
720. *HALOCYPTENA MICROSOMA*, Cones.—Proc. Philad. Acad. 1864, 78. (Coast of California.)
725. *CYMOCHOREA HOMOCYROA*, Cones.—Proc. Philad. Acad. 1864, 77. (Coast of California.)
737. *Colymbus adamsi*, Gray.—Proc. Zool. Soc. Lond. 1859, 167. (Alaska.)
- 763a. *LOMVIA TROILE CALIFORNICA* (Bryant) Coues.—*Cutarractes californicus*, BRYANT, Proc. Boston Soc. N. H. (Farallone Islands.)
764. *Lomvia arra*, Pall.—*Cephus arra*, Pall. Zoög. Rosso-As. ii. 1811, 347. (Alaska.)

c. List of North American genera which have been described or added to the fauna since 1859, together with those whose names or orthography have been changed since that date.

1. *HYLOCICHLA*, Baird, Review Am. B. i. June 2, 1864, 12 (type, *Turdus mustelinus*, Gmel.).

The *Turdus musicus* of Europe is a strict congener of *T. mustelinus*, and it is possible that some generic name may have been based upon it previous to the imposition of *Hylocichla*.

6. *Turdus*, Linnæus, S. N. ed. 10. i. 1758, 168 (type, *T. viscivorus*, Linn.).

The *T. iliacus*, although not agreeing strictly with *T. viscivorus* in details of external structure, is still hardly different enough to entitle it to separation. It is much more like true *Turdus* than either of the other American genera (*Hylocichla* and *Merula*).

\* We cannot cite the page of the “Proceedings”, but the record appears on p. 44 of separate pamphlet entitled “A Comparative List of Birds found in Europe and North America. By Percy Evans Freke.”

## Catalogue No.

7. *Merula*, "Leach, 1816" (type, *Turdus merula*, Linn.).

The proper generic division of the typical thrushes is a matter of considerable difficulty. Of the North American generic groups, *Myioichla* and *Hesperoichla* of Baird are sufficiently isolated, the latter being represented by a single species only, the former by all the smaller spotted species, besides the Song Thrush (*Turdus musicus*, Linn.) of Europe. I find no American species agreeing at all closely with *Turdus viscivorus* (the type of *Turdus*) in form; and a generic division based wholly or chiefly on coloration being out of the question, I find no other alternative than to adopt for the Robin and other American thrushes usually referred to "*Planesticus*" of Bonaparte (1854) the name *Merula*, Leach (1816), there being no essential difference in form between the type of the latter, *Turdus merula*, Linn. (*Merula nigra*, Leach) and our Robin (*T. migratorius*, Linn.); while a number of the Neotropical species exhibit the same sexual difference in coloration as *T. merula*. I would also refer to *Merula* the following Old World forms: *Turdus pilaris*, Linn. (type of *Arceuthornis*, Kaup, 1829), *Turdus atrogularis*, Temm. (type of *Cichloides*, Kaup, 1829), *Turdus torquatus*, Linn. (type of *Thoracocincla*, Reich., 1850), with perhaps some others.

9. *HEPEROCICHLA*, Baird, Review Am. B. i. July, 1864, 32 (type, *Turdus nervius*, Gmel.).
12. *Galeoscoptes*, Cabanis, Mus. Hein. i. 1850, 82 (type, *Muscicapa carolinensis*, Linn.).
19. *Cinclus*, Bechstein, Gemein. Naturg. 1802 (type, *Sturnus cinclus*, Linn.). [Cf. BAIRD, Review Am. B. i. 1864, 59, foot-note.]
20. *Cyanocitta*, Brehm, Vög. Deutschl. 1828 (type, *Motacilla suevica*, Linn.).
34. *Phylloscopus*, Boie, Isis, 1826, 792 (type ?)
50. *AURIPARUS*, Baird, Review Am. B. i. Aug. 1864, 85 (type, *Ægithalus flaviceps*, Sundev.).
61. *THRYOMANES*, Selater, Cat. Am. B. 1861, 22 (type, *Troglodytes bewicki*, Aud.).
65. *Anorthura*, Rennie, Montagu's Orn. Dict. 2d ed. 1831, 570 (type, *A. communis*, Rennie = *Motacilla troglodytes*, Linn.).
67. *Telmatodytes*, Cabanis, Mus. Hein. i. 1850, 78 (type, *Certhia palustris*, Wils.).
69. *Motacilla*, Linnaeus, S. N. 1735 (type, *M. alba*, Linn.).
70. *Budytes*, Cuvier, Règ. An. i. 1817, 371 (type, *Motacilla flara*, L.).
76. *Helonaa*.—*Helinaia*, Audubon, Synop. 1839, 66 (type, *Sylvia swainsoni*, Aud.). [Orthography emended by AGASSIZ, Nomencl. 1847. Cf. NEWTON, P. Z. S. 1879, 552.]
90. *PERISSOGLOSSA*, Baird, Review Am. B. i. 1864, 180 (type, *Motacilla tigrina*, Gm.).
92. *PEUCEDRAMUS*, Cones, in Henshaw's Orn. Wheeler's Survey, 1875, 201 (type, *Sylvia olivacea*, Giraud).
115. *Sturns*.—Cf. COUES, Bull. Nutt. Orn. Club.
124. *Wilsonia*, Bonaparte, Comp. List. 1838, 23 (type, *Sylvia mitrata*, Aud.?). [Cf. COUES, Bull. Nutt. Orn. Club, April, 1880, 95.\*]
131. *Cardellina*, "Dubus", Bonap. Consp. i. 1850, 312 (type, *Cardellina amicta*, Dubus = *Muscicapa rubrifrons*, Giraud).
132. *ERGATICUS*, Baird, Review Am. B. i. May, 1865, 264 (type, *Setophaga rubra*, Swains.).
133. *Basileuterus*, Cabanis, in Schomb. Guiana, iii. 1848, 666 (type, *Sylvia vermicolora*, Vieill.).
135. *Vircosylvia*, Bonaparte, Comp. List. 1838, 26 (type, *Muscicapa olivacea*, Linn.).
140. *LANIVIREO*, Baird, Review Am. B. i. May 23, 1866, 345 (type, *Vireo flavifrons*, Vieill.).

\* It is exceedingly doubtful whether *Wilsonia*, Bp., should displace *Myiodioctes*, Aud. Bonaparte's name occurs first in a mere list, is used only as a heading for a subgeneric group, and is unaccompanied either by a diagnosis or an indication of type. Audubon, however, only a year later, in designating the same group of birds by the new generic term *Myiodioctes*, gave an excellent diagnosis of the generic characters. It appears to us that the slight difference of date in favor of Bonaparte's name is greatly overbalanced by the pains which Audubon took to duly characterize his genus, thus conforming to the requirements of nomenclatural laws, which Bonaparte failed to do.

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148. *Lanius*, Linnæus, S. N. ed. 10, 1758, 93 (type, *L. excubitor*, Linn.). [Cf. COUES, Birds Colorado Val. i. 1878, 539.]
153. *Petrochelidon*, Cabanis, Mus. Hein. i. 1850, 47 (type, *Hirundo melanogaster*, Sw. = *P. swainsoni*, Schl.).
155. *Tachycineta*, Cabanis, Mus. Hein. i. 1850, 48 (type, *Hirundo thalassina*, Sw.).
157. *Cotile*, Boie.—Cf. WHARTON, The Ibis, Oct. 1879; COUES, Bull. Nutt. Orn. Club, April, 1880, 96.
158. *Stelgidopteryx*, Baird, B. N. Am. 1858, 312, in text (type, *Hirundo scripcunis*, Aud.).
167. *Pyrrhula*, Brisson, Orn. 1760 (type, *Loxia pyrrhula*, Linn. = *Emberiza coccinea*, Sandb.).
172. *Loxia*, Linnæus, S. N. ed. 10, i. 1758, 171 (type, *L. currirostra*, Linn.).
181. *Astragalinus*, Cabanis, Mus. Hein. i. 1851, 159 (type, *Fringilla tristis*, Linn.).
187. *Centrophanes*, Kaup, Ent. Gesch. Eur. Thierw. 1829 (type, *Emberiza lapponica*, Linn.).
190. *Rhynchophanes*, Baird, B. N. Am. 1858, 432, in text (type, *Plectrophanes maccowni*, Lawr.).
224. *Amphispiza*, COUES, Birds N. W. 1874, 234 (type, *Emberiza bilineata*, Cass.).
244. ZAMELODIA, COUES, Bull. Nutt. Orn. Club, v. April, 1880, 98 (type, *Loxia ludoviciana*, Linn.).
247. *Passerina*, Vieillot, Analyse, 1816, 30 (type, *Tanagra cyanea*, Linn.). [Cf. COUES, l. c. 96.]
253. *Phonipara*, Bonaparte, Consp. i. 1850, 494 (type, *Loxia canora*, Gmel.).
254. *Spiza*, Bonaparte, Obs. Wils. Orn. 1825 (part); Spec. Comp. 1827, 47 (type, *Emberiza americana*, Gmel.). [See anteâ, 3.]
279. *Sturnus*, Linnæus, S. N. ed. 10, i. 1758, 167 (type, *S. vulgaris*, Linn.).
285. *Gymnocitta*.—Cf. COUES, Bull. Nutt. Orn. Club, April, 1880, 98.
289. *Cyanocitta*, Strickland, Ann. Mag. N. H. xv. 1845, 260 (type, *Corvus cristatus*, Linn.). [Cf. COUES, Bull. Nutt. Orn. Club, April, 1880, 98.]
291. *Aphelocoma*, Cabanis, Mus. Hein. i. 1851, 221 (type, *Garrulus californicus*, Vig.).
299. *Alauda*, Linnæus, S. N. ed. 10, i. 1758, 165 (type, *A. arvensis*, Linn.).
308. *Pitangus*, Swainson, Zool. Jour. iii. 1827, 165 (type ?).
309. *Myiozetetes*, Selater, ex. Schiff.—*Myiozeta*, "Schiff.", Bp. Compt. Rend. xxxviii. 1854, — (type ?).—*Myiozetetes*, Sci. P. Z. S. 1859, 46.
310. *Myiodinastes*, Bonaparte, Compt. Rend. xxxviii. 1854, 657 (type ?).
331. *Oreithion*, Hartlaub, Jour. für Orn. 1853, 35 (type, *O. ierme*, Hartl.).
332. *Pachyrhamphus*, "Gray, 1838" (type, *Pachyrhynchus curieri*, Spix = *Tityra viridis*, Vieill.).
333. HADROSTOMUS, Cabanis, Mus. Hein. ii. Oct. 24, 1859, 84 (type, *Tityra atricapilla*, Vieill.).
334. *Eugenes*, Gould, Mon. Troch. pt. xii. 1856 (type, *Trochilus fulgens*, Swains.).
337. CALYPTE, Gould, Introd. Troch. oct. ed. 1861, 87 (type, *Ornismya costæ*, Bourc.).
342. *Atthis*, Reichenbach, Anfz. der Colib. 1853, 12 (type, *Ornismya heloiseæ*, Less. & Delattr.).
343. *Stellula*, Gould, Introd. Troch. oct. ed. 1861, 90 (type, *Trochilus calliope*, Gould).
344. *Calothorax*, Gray, Gen. B. 1840, 13 (type, *Cyanthus lucifer*, Swains.).
345. *Amazilia*, Lesson.—*Amazilis*, LESS. Ind. Gen. et Syn. du Gen. Troch. 1832, p. xxvii. (type, *Orthorhynchus amazili*, Less.).—*Amazilia*, Reich. Av. Syst. Nat. 1849, pl. 39.
347. *Basilinna*, Boie, Isis, 1831, 546 (type, *Trochilus leucotis*, Vieill.).
348. IACHE, Elliot, Synop. Troch. March, 1879, 234 (type, *Cyanthus latirostris*, Swains.).
349. *Cypselus*, Illiger, Prodr. 1811, 229 (type, *C. apus*, Linn.). [Cf. anteâ, 6.]
350. *Cypseloides*, Strenbel, Isis, 1848, 366 (type, *Cypselus fumigatus*, Natt.). [Cf. Selater, P. Z. S. 1865, 614.]
354. *Caprimulgus*, Linnæus, S. N. ed. 10, i. 1858, 193 (type, *C. europæus*, Linn.). [Cf. Proc. U. S. Nat. Mus. i. 1878, 143; ib. iii. 1880, 5.]

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355. *PHALÆNOPTILUS*, Ridgway, Proc. U. S. Nat. Mus. iii. March 27, 1880, 5 (type, *Caprimulgus nuttalli*, And.).
366. *Xenopicus*, Baird, B. N. Am. 1858, 83, in text (type, *Leuconerpes albolarvatus*, Cass.).
394. *Aluco*, Fleming, Phil. Zool. ii. 1828, 236 (type, *Strix flammea*, Linn.). [Cf. NEWTON, Yarrell's Brit. B. ed. 4, i. 150; Ibis, v. 94-105.]
395. *Asio*, Brisson, Orn. i. 1766, 28 (type, *Strix otus*, Linn.).
397. *Strix*, Linnæus, S. N. ed. 10, i. 1758, 92 (type, *S. stridula*, Linn.). [Cf. NEWTON, Ibis, ser. iii. vi. 94-105.]
399. *Ululu*, Cuvier, Règ. An. i. 1817, 329 (type, *Strix uralensis*, Pall.).
- In *History of North American Birds* (vol. iii, pp. 28-30) I adopted for the Great Gray Owl (*Strix cinerea*, Gmel.) the subgeneric name *Scotiapterx*, Swains., based upon this species, and on p. 8 of these Proceedings raised the same name to generic rank. A subsequent examination of *Strix uralensis*, Pallas, however, reveals the fact that the latter is strictly congeneric with *S. cinerea* and *S. lapponica*, and having been made the type of a genus *Uthla* by Cuvier, in 1817, the latter name must take precedence over *Scotiapterx*, which was not founded until 1831.
408. *Speotyto*, Gloger, Handb. Naturg. 1842, 226 (type, *Strix cunicularia*, Mol.).
411. *MICRATHENE*, Coues, Proc. Philad. Acad. 1866, 51 (type, *Athene whitneyi*, Cooper.).
412. *Hierofalco*, Cuvier, Règ. An. i. 1817, 312 (type, *Falco candicans*, Gm.).
416. *Æsalon*, Kaup, Natiirl. Syst. 1829, 40 (type, *Falco æsalon*, Gmel. = *F. regulus*, Pall.).
419. *RHYNCHOFALCO*, Ridgway, Proc. Boston Soc. 1873, 46 (type, *Falco femoralis*, Temm. = *F. fusco-carulescens*, Vieill.).
426. *Elanoides*, Vieillot, Nouv. Dict. xxiv. 1818, 101 (type, *Falco furcatus*, Linn.).
434. *ANTENOR*, Ridgway, Proc. Boston Soc. Nat. Hist. May, 1873, 63 (type, *Falco uncinatus*, Temm.).
444. *Urubitinga*, Lesson, Rev. Zool. 1839, 132 (no type!); Lafr. in d'Orb. Dict. Hist. Nat. ii. 1842, 786 (type, *Falco urubitinga*, Gm. = *F. zonurus*, Shaw).
446. *ONYCHOTES*, Ridgway, Proc. Philad. Acad. Dec. 1870, 142 (type, *O. gruberi*, Ridgw.).
450. *Thrasaëtus*, Gray, Proc. Zool. Soc. Lond. 1837, 108 (type, *Falco harpyia*, Linn.).
451. *Haliaëtus*, Savigny.—This is the original and correct orthography. [Cf. GRAY, Handb. i. 1869, 16; COUES, Bull. Nutt. Orn. Club, Apr. 1880, —.]
453. *PSEUDOGRYPHUS*, Ridgway, in B. B. & R. Hist. N. Am. B. iii. Jan. 1874, 337, 338 (type, *Vultur californianus*, Shaw).
455. *Catharista*, Vieillot, Analyse, 1816, 21 (type, *Vultur urubu*, Vieill. = *V. atrata*, Bartr. Cf. RIDGW. Bull. Nutt. Orn. Club, April, 1880, 80).
463. *ENGYPHILA*, Sundevall, Met. Nat. Av. Disp. Tent. 1872, 156 (type, *Columba rufaxilla*, Rich. & Bern.).
467. *GEOTRYGON*, Gosse, Birds Jam. 1847, 316, foot-note (type, *G. sylvatica*, Gosse = *Columba cristata*, Temm.).
469. *Ortalix*.—Cf. WHARTON, The Ibis, Oct. 1879, 450. [= *Ortalila*, Merrem (false orthography).]
471. *Canace*, Reichenbach, Av. Syst. Nat. 1851 (type, *Tetrao canadensis*, Linn.).
491. *DICHROMANASSA*, Ridgway, Bull. U. S. Geol. & Geog. Surv. Terr. iv. No. 1, Feb. 5, 1878, 246 (type, *Ardea rufa*, Bodd.).
492. *HYDRANASSA*, Baird, B. N. Am. 1858, 660, in text (type, *Ardea ludoriciensis*, Gmel. = *A. tricolor*, Müll.).
499. *Mycteria*, Linnæus, S. N. i. 1758, 140 (type, *M. americana*, Linn.).
501. *Eudocimus*, Wagler, Isis, 1832, 1232 (type, *Scolopax rubra*, Linn.). [Cf. ELLIOT, Ibis, 1877, 482.]
503. *Plegadis*, Kaup, Skizz. Ent. Gesch. 1829, 82 (type, *Tantalus falciuellus*, Linn.). [Cf. SCLATER & SALVIN, Ibis, 1878, 112.]
505. *Ajaja*, Reichenbach, Handb. 1851, p. xvi. (type, *Platalea ajaja*, Linn. = *P. rosea*, Briss.). [Cf. RIDGWAY, Proc. U. S. Nat. Mus. iii. 1880, 10.]



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512. *Vanellus*, Meyer, Vög. Deutschl. i. 1810, 10 (ex. Linn. 1735; type, *Tringa vanellus* Linn.).
516. *Oxyechus*, Reichenbach, Av. Syst. 1853, Introd. p. xviii. (type, *Charadrius vociferus*, Linn.).
522. *Ochthodromus*, Reichenbach, l. c. (type, *Charadrius wilsonius*, Ord.).
523. PODASCYS, Coues, Proc. Philad. Acad. 1866, 96 (type, *Charadrius montanus*, Towns.).
524. *Scolopax*, Linnæus, S. N. ed. 10, i. 1758, 145 (type, *S. rusticola*, Linn.).
530. *Arquatella*, Baird, B. N. Am. 1858, 717 (type, *Tringa maritima*, Brünn.).
533. *Aetodromas*, Kaup, Sk. Ent. Eur. Thierw. 1829, 37 (type, *Tringa minuta*, Leisl.).
539. *Pelidna*, Cuvier, Règ. An. 1817, 490 (type, *Tringa alpina*, Linn.).
547. *Totanus*, Bechstein, Nat. Deutschl. 1803 (type, *Scolopax calidris*, Linn.).
554. *Machetes*, Cuvier, Règ. An. 1817 (type, *Tringa pugnax*, Linn.). [Cf. COUES, Bull. Nutt. Orn. Club, Apr. 1880, 100.]
555. *Bartramia*, Lesson, Traité Ois. 1831, 553 (type, *B. laticauda*, Less. = *Tringa longicauda*, Bechst.). [Cf. COUES, l. c.]
564. *Lobipes*, Cuvier, Règ. An. 1817 (type, *Tringa hyperborea*, Linn.).
565. *Steganopus*, Vieillot, Enc. Méth. 1823 (type, *S. tricolor*, Vieill. = *Phalaropus wilsoni*, Sab.).
568. *Parra*, Linnæus, S. N. i. ed. 12, 1766, 259 (type, *P. jacana*, Linn.). [For generic characters and illustrations, see these Proceedings, vol. i. pp. 166, 167, pl. iii.]
578. *Ionornis*, Reichenbach, Av. Syst. 1853, 21 (type, *Fulica martinica*, Linn.).
586. *Olor*, Wagler, Isis, 1832, 1234 (type, *Cygnus musicus*, Bechst. = *Anas cygnus*, Linn.).
590. *Chen*, Boie, Isis, 1822 (type, *Anas hyperborea*, Pall.).
598. PHILACTE, Bannister, Proc. Philad. Acad. Nov. 1870, 131 (type, *Anas canagicus*, Sewast.).
619. *Clangula*, Fleming, Philos. Jour. 1823 (type, *Anas clangula*, Linn.). [Cf. DRESSER, B. Eur. pt. xlv. Dec. 1875; COUES, Bull. Nutt. Orn. Club, April, 1880, 101.]
635. NOMONYX, Ridgway, Proc. U. S. Nat. Mus. iii. March 27, 1880, 15 (type, *Anas dominica*, Linn.).
642. *Phalacrocorax*, Brisson, Orn. 1760 (type, *Pelecanus carbo*, Linn.). [Cf. SHARPE, Cat. B. Brit. Mus. iii. 1877, 143, foot-note.]
696. *Megalestris*, Bonaparte, Consp. ii. 1856, 206 (type, *Larus catarractes*, Linn. = *Catharacta skua*, Brünn.). [Cf. COUES, B. N. W. 1874, 603, 604, where, however, *Buphagus*, Möhring, is adopted; but Möhring's names being inadmissible,\* *Megalestris*, Bp., "strictly its only synonym" seems the only one available.]
703. *Phæbetria*, Reichenbach, Av. Syst. Nat. 1853, pl. 26, fig. 348 (type, *Diomedea fuliginosa*, Gmel.).
704. *Ossifraga*, Hombron & Jacquinot, Compt. Rend. xviii. 1844, 356 (type, *Procellaria gigantea*, Gmel.).
706. *Priocella*, Hombron & Jacquinot, Compt. Rend. xviii. 1844, 357 (type, *Procellaria glacialis*, Smith = *P. tenuirostris*, Aud.).
707. *Priofinus*, Hombron & Jacquinot, Compt. Rend. xviii. 1844, 355 (type, *Procellaria cinerea*, Gmel. (?) = *P. melanura*, Bonn.).
717. *Cestrelata*, Bonaparte, Consp. ii. 1855, 188 (type, *Procellaria hesitata*, Temm.).
720. HALOCYPTENA, Coues, Proc. Philad. Acad. 1864, 78 (type, *H. microsoma*, Coues).
721. *Procellaria*, Linnæus, S. N. ed. 12, i. 1763, 212 (type, *P. pelagica*, Linn.).
722. *Oceanites*, Keyserling & Blasius, Wirb. Eur. 1840, 238 (type, *Procellaria oceanica*, Kuhl.).

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\*Cf. COUES, Bull. Nutt. Orn. Club, April, 1880, p. 100, sp. 437, *Machetes pugnax*.



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723. *Cymochorea*, Coues, Proc. Philad. Acad. 1864, 75 (type, *Procellaria leucorrhœa*, Vieill.).
726. *Oceanodroma*, Reichenbach, Av. Syst. 1853, xviii. (type, *Procellaria furcata*, Gmel.).
730. *Echmophorus*, Coues, Proc. Philad. Acad. 1832, 229 (type, *Podiceps occidentalis*, Lawr.).
732. *Dytes*, Kaup, Syst. Ent. Eur. Thierw. 1829 (type, *Colymbus cornutus*, Gmel.).
734. *Tachybaptus*, Reichenbach, Syst. Nat. Av. 1853, pl. 2 (type, *Colymbus minor*, Gmel.).
742. *Utamania*, Leach, Syst. Cat. 1816 (type, *Alca torda*, Linn.). [Cf. COUES, Proc. Philad. Acad. 1868, 18, 19.]
743. *Fratercula*, Brisson, Orn. 1760 (type, *Alca arctica*, Linn.). [Cf. COUES, Proc. Philad. Acad. 1868, 21.]
745. *Lunda*, Pallas, Zogr. Rosso-As. 1811, 363 (type, *Alca cirrhata*, Pall.). [Cf. COUES, Proc. Philad. Acad. 1868, 26.]
746. *Ceratorhina*.—Cf. COUES, Key, 1872, 341. [= *Cerorhinca*, Bonap. Ann. Lyc. N. Y. ii. 1828, 428 (false orthography).]
748. *Simorhynchus*, "Merrem. —, 1819 (type, *Alca cristatella*, Pall. *vide* G. R. Gray)". [Cf. COUES, Proc. Philad. Acad. 1863, 35.]
750. *Ciceronia*, Reichenbach, Av. Syst. Nat. 1853, — (type, *Phaleris microceros*, Brandt = *Uria pusilla*, Pall.).
752. *Alle*, Link, Beschr. Natur.-Samml. Univ. Rostock, 1806, 17 (type, *A. nigricans*, Link = *Alca alle*, Linn.). [Cf. COUES, Bull. Nutt. Orn. Club, iv. Oct. 1879, 244.]
753. *Synthliborhampus*, BRANDT, Bull. Acad. St. Petersb. ii. 1837 (type, *Alca antiqua*, Gmel.).
763. *Lomvia*, Brandt, Bull. Acad. St. Petersb. ii. 1837, 345 (type, *Colymbus troille*, Linn.). [Cf. COUES, Proc. Philad. Acad. 1868, 75.]

d. *Species included in the catalogue which have not yet (according to the records) actually been taken within the prescribed limits.*

[The following species enumerated in the catalogue have not, to this date, been taken within the United States; but all are known to occur so near our southern border as to render it quite certain that their capture within our limits is but a question of time and investigation. There are also included in this category all the species which are peculiar to the islands of Socorro and Guadalupe and the peninsula of Lower California.]

8. *MERULA CONFINIS*. (Cape St. Lucas.)
14. *HARPORHYNCHUS CINEREUS*. (Cape St. Lucas.)
18. *HARPORHYNCHUS GRAYSONI*. (Socorro.)
31. *REGULUS OBSCURUS*. (Guadalupe.)
43. *PARUS MERIDIONALIS*. (Highlands of Mexico.)
49. *PSALTRIPARUS MELANOTIS*.\* (Highlands of Mexico.)
- 55a. *CERTHIA FAMILIARIS MEXICANA*. (Highlands of Mexico.)
57. *CAMPYLORHYNCHUS AFFINIS*. (Cape St. Lucas.)
- 58a. *SALPINCTES OBSOLETUS GUADALUPENSIS*. (Guadalupe.)
62. *THRYOMANES BREVICAUDA*. (Guadalupe.)
89. *PARULA PITIAYUMI INSULARIS*. (Socorro.)
171. *CARPODACUS AMPLUS*. (Guadalupe.)
195. *PASSERCULUS GUTTATUS*. (Cape St. Lucas.)
223. *JUNCO INSULARIS*. (Guadalupe.)
- 233c. *PIPILO MACULATUS CONSOBRINUS*. (Guadalupe.)
- 233d. *PIPILO MACULATUS CARMANI*. (Socorro.)
- 240a. *PIPILO FUSCUS ALBIGULA*. (Cape St. Lucas.)

\* Probably seen by me in August, 1868, in the East Humboldt Mts., Nevada. (Cf. Orn. 40th Parallel Exp. 1877, p. 415.)

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- 267. *ICTERUS WAGLERI*. (Mexico.)
- 288. *PSILORHINUS MORIO*. (E. Mexico.)
- 291. *APHELOCOMA ULTRAMARINA COUCHII*. (E. Mexico.)
- 347. *BASILINNA XANTUSI*. (Cape St. Lucas.)
- 363a. *PICUS SCALARIS LUCASANUS*. (Cape St. Lucas.)
- 377a. *MELANERPES FORMICIVORUS ANGUSTIFRONS*. (Cape St. Lucas.)
- 380. *COLAPTES RUFIPILEUS*. (Guadalupe.)
- 381. *MOMOTUS CÆRULEICEPS*. (E. Mexico.)
- 384. *TROGON AMBIGUUS*. (Mexico.)
- 393. *CONURUS HOLOCHLORUS BREVIPES*. (Socorro.)
- 415. *FALCO ALBIGULARIS*. (Whole of tropical America.)
- 424. *POLYBORUS LUTOSUS*. (Guadalupe.)
- 653. *SULA PISCATOR*. (Socorro.)
- 655. *PILETHON ÆTHEREUS*. (Newfoundland banks; Socorro?)
- 460. *ZENÆDURA GRAYSONI*. (Socorro.)

Of the following species given in the catalogue no specimens are known to have been taken within the limits of the United States, with the exception of those described and figured in Giraud's "Sixteen Species of Texan Birds" (1841).\*

- 59. *CATHERPES MEXICANUS* (= *Certhia albifrons*, Giraud).
- 130. *SETOPHAGA MINIATA* (= *Muscicapa derhami*, Giraud).
- 132. *ERGATICUS RUBER* (= *Parus leucotis*, Giraud).
- 133. *BASILEUTERUS CULICIVORUS* (= *Muscicapa brasieri*, Giraud).
- 134. *BASILEUTERUS BELLII* (= *Muscicapa bellii*, Giraud).
- 160. *EUPHONIA ELEGANTISSIMA* (= *Pipra galericulata*, Giraud).
- 182b. *ASTRAGALINUS PSALTRIA MEXICANUS* (= *Fringilla texensis*, Giraud).
- 309. *MYIOZETES TEXENSIS* (= *Muscicapa texensis*, Giraud).
- 314. *MYIARCHUS LAWRENCEI* (= *Tyrannula lawrencii*, Giraud).
- 329. *EMPIDONAX FULVIFRONS* (= *Muscicapa fulvifrons*, Giraud).

c. *Species (chiefly Palearctic) which occur only as stragglers or visitants in Eastern North America, or which occur regularly only in Greenland and adjacent portions of the continent.*†

- [6.] *TURDUS ILIACUS*. Accidental in Greenland.
- [69.] *MOTACILLA ALBA*. Accidental in Greenland.
- [178.] *ÆGIOTHUS CANESCENS*. Resident in Greenland.
- [279.] *STURNUS VULGARIS*. Accidental in Greenland.
- [412a.] *HIEROFALCO GYRFALCO ISLANDUS*. Resident in South Greenland.
- [416.] *ÆSALON REGULUS*. Accidental in Greenland.
- [422.] *TINNUNCULUS ALAUDARIUS*. Accidental in Greenland.
- [435.] *BUTEO VULGARIS*. Accidental in Michigan? [Cf. MAYNARD, Bull. Nutt. Orn. Club, i. 18.]
- 452. *HALLEËTUS ALBICILLA*. Resident in Greenland.
- [488.] *ARDEA CINEREA*. Accidental in Greenland.
- [506.] *HENIATOPUS OSTRALEGUS*. Accidental in Greenland.
- [514.] *CHARADRIUS PLUVIALIS*. Accidental in Greenland.
- 518. *ÆGIALITIS HIATICULA*. Breeding in Greenland and west of Cumberland Gulf.
- [524.] *SCOLOPAX RUSTICULA*. Accidental in Newfoundland and Eastern United States.
- [526.] *GALLINAGO MEDIA*. Casual in Greenland and Bermudas.

\* These specimens are now in the collection of the United States National Museum.

† Strictly pelagic birds, which are more or less numerous off the coast, are excluded from this and the following lists.

## Catalogue No.

- [539.] PELIDNA ALPINA. Breeds in Greenland and Hudson's Bay Territory.  
 [540.] PELIDNA SUBARQUATA. Casual in Eastern North America (several records).  
 [546.] LIMOSA AEGOCEPHALA. Accidental in Greenland.  
 [547.] TOTANUS GLOTTIS. Accidental in Florida.  
 [551.] RHYACOPHILLUS OCHROPUS. Accidental in Nova Scotia.  
 [554.] MACHETES PUGNAX. Casual in Eastern North America (several records).  
 [561.] NUMENIUS PILEOPUS. Accidental in Greenland.  
 [573.] PORZANA MARUETTA. Accidental in Greenland.  
 [577.] CREX PRATENSIS. Casual in Eastern North America, including Greenland.  
 [586.] OLOR CYGNUS. Accidental in Greenland.  
 [587.] OLOR MINOR. Casual (?) in fur countries.  
 [593.] ANSER ALBIFRONS. Breeds in South Greenland.  
 [597.] BERNICLA LEUCOPSIS. Casual in Eastern North America.  
 [611.] NETTION CRECCA. Casual in Eastern North America.  
 627. SOMATERIA MOLLISSIMA. Resident in Greenland and west side of Cumberland Gulf.  
 [631.] MELANETTA FUSCA. Accidental in Greenland.  
 [665.] LARUS AFFINIS. Accidental in Greenland.  
 [694.] HYDROCHELIDON LEUCOPTERA. Accidental in Wisconsin.  
 [711.] PUFFINUS ANGLORUM. Casual (?) off Atlantic coast.  
 [717.] CESTRELATA HÆSITATA. Accidental off Atlantic coast of U. S.  
 [718.] CESTRELATA BULWERI. Accidental near Greenland.  
 728. FREGETTA GRALLARIA. Accidental off coast of Florida.  
 [733.] DYTES AURITUS. Breeds in South Greenland.  
 743a. FRATERCULA ARCTICA GLACIALIS. Resident in Greenland.

*f. Palwarcic and oceanic species occurring only in Alaska and other parts of the Pacific coast.*

- [20.] CYANECULA SUECICA. St. Michael's, Alaska, June 5, 1850. (See p. 215.)  
 [34.] PHYLLOSCOPUS BOREALIS. Breeds in Alaska.  
 [44.] PARUS CINCTUS. Abundant resident in Alaska.  
 [70.] BUDYTES FLAVA. Breeds abundantly in Alaska.  
 [167.] PYRRHULA CASSINI. Resident (?) in Alaska.  
 [399a.] ULULA CINEREA LAPPONICA. Casual (?) in Alaska (St. Michael's).  
 [407a.] SURNIA FUNEREA ULULA. Casual (?) in Alaska (St. Michael's).  
 511. APHRIZA VIRGATA. Casual along entire Pacific coast of America.  
 [515a.] CHARADRIUS DOMINICUS FULVUS. Regular autumnal visitant to Alaska.  
 [519.] ÆGIALITIS CURONICA. Accidental in California (?).  
 [533.] ACTODROMAS ACUMINATA. Accidental on coast of Alaska.  
 544. LIMOSA LAPPONICA NOVE-ZEALANDIÆ. Abundant visitant to Alaska.  
 553. HETEROSCELUS INCANUS. Whole Pacific coast. (Breeds.)  
 [562.] NUMENIUS TAHITIENSIS. Accidental in Alaska (Kadiak).  
 [702.] DIOMEDEA CULMINATA. Accidental off mouth of Columbia River (Audubon).  
 [703.] PIIBETRIA FULIGINOSA. Casual off Pacific coast.  
 [704.] OSSIFRAGA GIGANTEA. Accidental off Pacific coast of U. S.  
 706. PRIOCELLA TENUIROSTRIS. Casual (?) off Pacific coast.  
 707. PRIOFINUS MELANURUS. Accidental off coast of California.  
 710. PUFFINUS CREATOPUS. Accidental (?) off coast of California.  
 713. PUFFINUS GAVIA. Casual (?) off coast of Lower California.  
 715. PUFFINUS GRISEUS. Casual (?) off coast of Lower California.  
 716. PUFFINUS TENUIROSTRIS. North Pacific (casual?).  
 [719.] DAPTION CAPENSIS. Accidental off coast of California.

*g. Palaeartic species occurring both in Greenland and Alaska, but not recorded from any intermediate point in North America.*

Catalogue No.

[21.] *SAXICOLA OENANTHE*. Breeds in Greenland and on west side of Cumberland Gulf.

[72.] *ANTHUS PRATENSIS*. Accidental (?) in Greenland and Alaska.

[512.] *VANELLUS CRISTATUS*. Accidental in Greenland (and Alaska?).

[606.] *MARECA PENELOPE*. Occurs in various parts of North America, south to North Carolina, and San Francisco.

*h. Tropical American species occurring only in southern portions of United States.*

EASTERN PROVINCE, INCLUDING FLORIDA AND COAST OF TEXAS.\*

137. *VIREOSYLVA CALIDRIS BARBATULA*. (South Florida.) *Hab.* Cuba.

159. *CERTHIOLA BAHAMENSIS*. (Indian Key.) *Hab.* Bahamas.

184. *CHRYSOMITRIS NOTATA*. (Accidental in Kentucky, *vide* AUDUBON.) *Hab.* high-lands of Mexico and Guatemala.

253. *PHONIPARA ZENA*. (Key West.) *Hab.* West Indies in general.

265. *ICTERUS VULGARIS*. (South Carolina, etc.) *Hab.* Jamaica and northern South America.

302. *Milvulus tyrannus*. (Accidental in Mississippi, New Jersey, etc.) *Hab.* whole of tropical South America east of the Andes, Atlantic coast region of Central America (and Mexico?).

303. *TYRANNUS DOMINICENSIS*. (Florida.) *Hab.* whole of West Indies.

357b. *CHORDEILES POPETUE MINOR*. (Florida.) *Hab.* Cuba and Jamaica.

356. *COCYZUS SENICULUS*. (Florida, Louisiana?) *Hab.* West Indies and parts of northern South America.

389. *CROTOPHAGA ANL*. (Tortugas; near Philadelphia!) *Hab.* West Indies and parts of northern South America.

420a. *TINNUNCULUS SPARVERIUS ISABELLINUS*.

421. *TINNUNCULUS SPARVERIOIDES*. (Florida.) *Hab.* Cuba.

429. *ROSTRHAMUS SOCIABILIS PLUMBEUS*. (Florida.) *Hab.* Tropical America in general.

458. *COLUMBA LEUCOCEPHALA*. (Florida Keys.) *Hab.* West Indies; Honduras.

462. *ZENÆDA AMABILIS*. (Florida Keys.) *Hab.* Greater Antilles.

467. *GEOTRYGON MARTINICA*. (Florida Keys.) *Hab.* West Indies.

468. *STARXENAS CYANOCEPHALA*. (Florida Keys.) *Hab.* Cuba.

502. *EUDOCIMUS RUBER*. (Louisiana?) *Hab.* Northern South America; Jamaica.

503. *PLEGADIS FALCINELLUS*. (Florida, straggling northward.) *Hab.* Eastern Hemisphere chiefly.

578. *IONORNIS MARTINICA*. (Southern portions in general, straggling northward.) *Hab.* whole of tropical America.

581. *ARAMUS PICTUS*. (Florida.) *Hab.* West Indies and Atlantic coast of Central America.

585. *PHENICOPTERUS RUBER*. (Florida Keys.) *Hab.* West Indies and shores of Gulf of Mexico and Caribbean Sea; Galapagos.

635. *NOMONYX DOMINICUS*. (Accidental on Lake Champlain and in Wisconsin.) *Hab.* whole of tropical America.

692. *STERNA ANÆSTHETA*. (Florida.) *Hab.* tropics generally.

734. *TACHYBAPTES DOMINICUS*. (Lower Rio Grande, in Texas.) *Hab.* Tropical America in general.

\* Excluding species peculiar to Florida.

## SOUTHWESTERN BORDER—TEXAS TO CALIFORNIA.

[The species of this list which are *peculiar* to the more elevated portions of Mexico and Guatemala (including the contiguous southern border of the United States) are distinguished by an asterisk (\*) prefixed to the number. The avi-fauna of temperate Mexico is decidedly more nearly related to that of the Western Province of North America than to the tropical fauna of the Mexican *tierra caliente* or hot coast-region. The genera of Neotropical affinities are printed in italics.]

## Catalogue No.

- \* 13a. HARPORHYNCHUS RUFUS LONGIROSTRIS. (Lower Rio Grande.)
- \* 15. HARPORHYNCHUS CURVIROSTRIS. (Lower Rio Grande.)
- \* 26. PHAINOPEPLA NITENS. (Texas to California.)
- \* 37. LOPHOPHANES ATROCISTATUS. (Lower Rio Grande.)
- \* 39. LOPHOPHANES WOLLWEBERI. (New Mexico; Arizona.)
- \* 49. PSALTRIPARUS MELANOTIS. (Nevada?)
- \* 50. AURIPARUS FLAVICEPS. (Texas to Arizona.)
- \* 56. *Campylorhynchus brunneicapillus*. (Texas to California.)
- \* 59. CATHERPES MEXICANUS. (Lower Rio Grande?)
- \* 60a. THRYOTHORUS LUDOVICIANUS BERLANDIERI. (Lower Rio Grande.)
- \* 61b. THRYOMANES BEWICKI LEUCOGASTER. (Lower Rio Grande to Arizona.)
- \* 83. HELMINTHOPHAGA LUCIE. (Arizona.)
- \* 89a. PARULA INSULARIS NIGRILORA. (Lower Rio Grande.)
- \* 92. PEUCEDRAMUS OLIVACEUS. (Lower Rio Grande? Arizona.)
- \* 104. DENDRECA GRACILE. (Arizona.)
- \* 106. DENDRECA CHRYSOPARIA. (Texas.)
- \* 129. SETOPHAGA PICTA. (Lower Rio Grande? Arizona.)
- \* 130. SETOPHAGA MINIATA. (Lower Rio Grande?)
- \* 131. CARDELLINA RUBRIFRONS. (Lower Rio Grande? Arizona.)
- \* 132. ERGATICUS RUBER. (Lower Rio Grande?)
- 133. *Basileuterus culicivorus*. (Lower Rio Grande?)
- \* 134. *Basileuterus belli*. (Lower Rio Grande?)
- \* 136. VIREOSYLVA AGILIS FLAVO-VIRIDIS. (Lower Rio Grande?)
- \* 142. VIREO ATRICAPILLUS. (Texas.)
- \* 147. VIREO VICINIOR. (Arizona; Southern California.)
- 160. *Euphonia elegantissima*. (Lower Rio Grande?)
- \* 163. PYRANGA HEPATICA. (New Mexico; Arizona.)
- \* 164a. PYRANGA ÆSIVA COOPERI. (New Mexico; Arizona.)
- \* 182a. ASTRAGALINUS PSALTRIA ARIZONÆ. (Upper Rio Grande to Arizona.)
- 182b. ASTRAGALINUS PSALTRIA MEXICANUS. (Lower Rio Grande?)
- \* 215. SPIZELLA ATROGULARIS. (Lower Rio Grande to Lower California.)
- \* 222. JUNCO CINEREUS. (Arizona.)
- \* 227. PEUCEA ARIZONÆ. (Lower Rio Grande to Arizona.)
- \* 230a. PEUCEA RUFICEPS BOUCARDI. (Arizona.)
- \* 236. *Embernagra rufivirgata*. (Lower Rio Grande.)
- \* 241. PIPILO ABERTI. (Arizona.)
- \* 242a. CARDINALIS VIRGINIANUS IGNEUS. (Arizona; Lower California.)
- \* 243. PYRRHULOXIA SINUATA. (Lower Rio Grande to Lower California.)
- \* 250. PASSERINA VERSICOLOR. (Lower Rio Grande.)\*
- 252. *Spermophila moreletii*. (Lower Rio Grande.)
- \* 258a. MOLOTHRUS ATER OBSCURUS. (Texas to Lower California.)
- 259. MOLOTHRUS ÆNEUS. (Lower Rio Grande.)
- 263a. STURNELLA MAGNA MEXICANA. (Lower Rio Grande.)

\* Accidental in Michigan!



Catalogue No.

- \*266. *ICTERUS AUDUBONII*. (Lower Rio Grande.)
- \*268. *ICTERUS PARISORUM*. (Texas to Lower California.)
- \*269. *ICTERUS CUCULLATUS*. (Texas to Lower California.)
- \*275. *QUISCALUS MACRURUS*. (Lower Rio Grande.)
- \*276. *QUISCALUS PALUSTRIS*. (Head of Gulf of California? coast of Louisiana.)
- \*295. *APHELOCOMA SORDIDA ARIZONÆ*. (Arizona.)
- \*296. *Xanthura luxuriosa*. (Lower Rio Grande.)
- \*334. *EUGENES FULGENS*. (Arizona.)
- \*342. *ATTHIS HELOISÆ*. (Texas.)
- \*344. *CALOTHORAX LUCIFER*. (Arizona.)
- \*345. *Amazilia fuscicaudata*. (Lower Rio Grande.)
- \*346. *Amazilia yucatanensis*. (Lower Rio Grande.)
- \*348. *IACHE LATIROSTRIS*. (Arizona.)
- 356. *NYCTIDROMUS ALBICOLLIS*. (Lower Rio Grande.)
- \*358. *CHORDEILES ACUTIPENNIS TEXENSIS*. (Texas to Lower California.)
- \*363. *PICUS SCALARIS*. (Texas to Arizona.)
- \*365. *PICUS STRICKLANDI*. (Arizona.)
- \*373. *CENTURUS AURIFRONS*. (Lower Rio Grande.)
- \*374. *CENTURUS UROPYGIALIS*. (Arizona.)
- 383. *CERYLE AMERICANA CABINISH*. (Texas to Arizona.)
- 390. *CROTOPHAGA SULCIROSTRIS*. (Lower Rio Grande.)
- \*391. *RYNCHOPSITTA PACHYRHYNCHA*. (Rio Grande Valley?)
- \*402b. *SCOPS ASIO MACCALLI*. (Texas.)
- \*403. *SCOPS TRICHOPSIS*. (New Mexico; Stockton, Cal.?)
- \*404. *SCOPS FLAMMEOLUS*. (North to about 40° in higher western mountains.)
- 410. *GLAUCIDIUM PHALÆNOIDES*. (Texas and Arizona.)
- \*411. *MICRATHENE WHITNEYI*. (Arizona; S. E. California.)
- 419. *RYNCHOPALCO FUSCO-CERULESCENS*. (Texas; New Mexico.)
- 434. *ANTENOR UNICINCTUS HARRISI*. (Louisiana to Lower California.)
- 440. *BUTEO ABBREVIATUS*. (Arizona; Southern California.)
- 441. *BUTEO ALBICAUDATUS*. (S. Texas.)
- 444. *Urbitinga anthracina*. (Arizona.)
- 445. *ASTURINA NITIDA PLAGIATA*. (Arizona.)\*
- 450. *THRASÆTUS HARPYIA*. (Lower Rio Grande; Louisiana?)
- 457. *COLUMBA ERYTHRINA*. (S. Texas.)
- \*463. *Engyptila albifrons*. (S. Texas.)
- 464. *MELOPELIA LEUCOPTERA*. (Texas to Lower California.)
- \*466. *SCARDAPELLA INCA*. (Southern Texas.)
- \*469. *Ortalis vetula maccalli*. (S. Texas.)
- \*470. *MELEAGRIS GALLOPAVO*. (New Mexico; Upper Rio Grande in Texas.)
- 483. *LOPHORTYX GAMBELI*. (W. Texas to Arizona.)
- 484. *CALLIPEPLA SQUAMATA*. (W. Texas to Arizona.)
- 485. *CYRTONYX MASSENA*. (W. Texas to Arizona.)
- 499. *Mycteria americana*. (Southern Texas.)

ENTIRE SOUTHERN BORDER.

- 423. *POLYBORUS CHERIWAY*.
- 427. *ELANUS GLAUCUS*.
- 455. *CATHARISTA ATRATA*.
- 465. *CHAMÆPELIA PASSERINA*.

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\* Accidental in Southern Illinois (only once observed).

i. *Supposed valid species described by Audubon and Wilson, which have not since been met with, and of which no specimens are known to exist in collections.*

Catalogue No.

32. *REGULUS CUVIERI*, AUD. Orn. Biog. i. 1832, 288, pl. 55 ("Banks of Schuylkill River, Pa., June, 1812").—BAIRD, B. N. Am. 1858, 228; Review, i. 1864, 66.—B. B. & R. Hist. N. Am. B. i. 1874, 75, pl. 5, fig. 7.
91. *PERISSOGLOSSA CARBONATA* (Aud.) Ridgw.—*Sylvia carbonata*, AUD. Orn. Biog. i. 1831, 308, pl. 60 (Kentucky).—*Dendroica carbonata*, BAIRD, B. N. Am. 1858, 287; Review, i. 1865, 207.—*Perissoglossa carbonata*, B. B. & R. Hist. N. Am. B. i. 1874, 214, pl. 12, fig. 3.
112. *DENDROICA MONTANA* (Wils.) Baird.—*Sylvia montana*, WILS. Am. Orn. v. 1812, 113, pl. xlv. fig. 2 ("Blue Mts. of Pennsylvania").—AUD. Orn. Biog. v. 294 ("California").—*Dendroica montana*, Baird, B. N. Am. 1858, 279; Review, i. 1865, 190.—*Dendroica montana*, B. B. & R. Hist. N. Am. B. i. 1874, 271.
126. *WILSONIA MINUTA* (Wils.) Bp.—*Muscicapa minuta*, WILS. Am. Orn. vi. 1812, 62, pl. 1. fig. 5.—AUD. Orn. Biog. v. pl. 434, fig. 3; B. Am. i. pl. 67.—*Myiodioctes minutus*, Baird, B. N. Am. 1858, 293; Review, 1865, 241.—B. B. & R. Hist. N. Am. B. i. 1874, 316, pl. 16, fig. 2.

1. *List of untenable species and races of North American birds described since 1858.*

1. *Helminthophaga ruficapilla* var. *ocularis*, B. B. & R. Hist. N. Am. B. i. 1874, 191. (Chicago, Ill.) = No. 85.
- (?) 2. *Helminthophaga ruficapilla* var. *gutturalis*, B. B. & R. Hist. N. Am. B. i. 1874, 191. (East Humboldt Mts., Nevada; Ft. Tejon, Cal.) = No. 85?
3. *Helminthophaga celata* var. *obscura*, B. B. & R. Hist. N. Am. B. i. 1874, 192. (Georgia and Florida.) = No. 86.
4. *Hirundo bicolor* var. *vespertina*, COOPER, Am. Nat. x. Feb. 1876, 91. (California.) = No. 155.
5. *Collyrio chemungensis*, GREGG, Proc. Elmira Acad. i. 1870, 9. (New York.) = No. 148, juv.
6. *Hesperiphona vespertina* var. *montana*, RIDGW. in B. B. & R. Hist. N. Am. B. i. 1874, 449, pl. 22, fig. 4. (Southern Rocky Mts. and mountain regions of Mexico.) = No. 165.
- (?) 7. *Loxia atrata*, von HOMEYER, Jour. für Orn. 1879, 179. (North America.) = No. 173??\*
8. *Leucosticte campestris*, BAIRD, Orn. Cal. i. 1870, 163. (Colorado.) = No. 175a (individual variation).
- (?) 9. *Linaria brunnescens*, von HOMEYER, Jour. für Orn. 1879, 184. ("Lapland, Grönland, Schweden.")† = No. 179a?

\* "Somewhat smaller than *L. leucoptera*, but with about the same length of wing, the tail at least 10mm shorter. Distinguished by its coloration. The red in ground tone is nearest that of the "Hakengimpel" [*Pinicola enucleator*] but everywhere darker, and saturated, as it were, with black, this color extending indefinitely both on the back as well as on the middle of the belly to the breast, as also on the lower tail-coverts. The feet are even darker colored than in *leucoptera*. The wing-bands are unaffected for the most part, although not quite so broad. This is especially seen in the first or terminal band, which begins, scarcely visible, at the edge of the wing, and remains very inconsiderable to the middle, then quickly expands to a great rounded spot. The extent of the second band is everywhere much more limited than in *leucoptera*."

"This is decidedly not a melanism, as is shown, not alone by the character of the coloration, but by the occurrence of two old males exactly alike."

"My two birds came from North America."—[Translation.]

† "The dark Linné is nearest to this species in size, but it is easily distinguished by many features. The whole upper parts are blackish brown, with very narrow margins to the feathers of whitish and rusty yellow, which, on the rump, return to the ground color; on the sides of the head the feathers also have very fine, rusty white margins; the throat-spot is very large; the entire under parts to the middle of the belly are densely covered with many large, dark brown longitudinal streaks. Two birds killed in Lapland, June-July (sexes not determined), show a tender red on the side of the head. The

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10. *Egiothus fuscescens*, COUES, Proc. Philad. Acad. 1861, 222. (Labrador.) = No. 179 (midsummer plumage).
11. *Egiothus rostratus*, COUES, l. c. (Greenland.) = No. 179a (midsummer plumage).
12. *Centronyx ochrocephalus*, AIKEN, Am. Nat. vii. 1873, 237. (El Paso Co., Colorado.) = No. 191 (autumnal plumage).
13. *Passerculus caboti*, B. B. & R. Hist. N. Am. B. iii. 1874, pl. xlv. fig. 9. (Nahant, Massachusetts.) = No. 233. [Not described!]
14. *Spizella evura*, COUES, The Ibis, 1865, 118, 164. (Ft. Whipple, Ariz.) = No. 215, young.
15. *Passerella obscura*, VERRILL, Proc. Boston Soc. ix. 1862, 153. (Anticosti I.) = No. 235, young.
16. *Hedymeles melanocephalus* var. *capitalis*, B. B. & R. Hist. N. Am. B. ii. 1874, 74. (Pacific coast of Mexico and United States.) = No. 245.
17. *Guiraca caerulea* var. *eurhyncha*, COUES, Am. Nat. viii. 1874, 563. (Mexico.) = No. 246.
18. *Dolichonyx oryzivorus* var. *albinucha*, RIDGW. Bull. Essex Inst. v. Nov. 1873, 192. (Missouri plains to Salt Lake Valley.) = No. 257.
19. *Empidonax pygmaeus*, MINOT, Land and Game Birds New England, 1877, —. (Near Boston, Mass.) [Avis fictita!]
20. *Dryobates hyloscopus*, CAB. & HEINE, Mus. Hein. iv. June 25, 1863, 69. (San José, Cal.) = No. 360b.
21. *Dryobates homorus*, CAB. & HEIN. Mus. Hein. iv. June 25, 1863, 65. (California.) = No. 361a.
22. *Picus cuvieri*, MALH. Mon. Pic. i. 1861, 85, pl. 22, fig. 3. (North America.) = No. 360, ♀ ad.
23. *Picus turati*, MALH. Mon. Pic. i. 1861, 125, pl. 29, figs. 5, 6, 7. (California and Rocky Mountains.) = No. 361, ♀ ad.
24. *Chamaepelia passerina* var. *pallascens*, BAIRD, Proc. Philad. Acad. 1859, 305. (Cape St. Lucas.) = No. 465.
25. *Pediocetes kennicotti*, SUCKL. Proc. Philad. Acad. 1861, 361. = No. 478.
26. *Bonasa jobsii*, JAYCOX, Am. Nat.
27. *Ibis thalassinus*, RIDGW. Am. Nat. viii. Feb. 1874, 110. (Pacific coast of America, from California to Chili.) = No. 504, juv.
28. *Ardea cyanostris*, CORY, Birds of the Bahama Islands, 1880, —. (Bahamas.) = No. 492, breeding plumage.
29. *Cygnus passmorei*, HINCKS, Pr. Linn. viii. 1864, 1. (Toronto, Canada.) = No. 589, juv.
30. *Bernicla barnstoni*, ROSS, Canad. Nat. vii. April, 1862, —. = 594, var. ?
31. *Bernicla leucolema*, MURRY, Edinb. Phil. Jour. April, 1859, 226, pl. 4, fig. 1. = 594, var.
32. *Pelecanus occipitalis*, RIDGW. Am. Sportsman, iv. 1874, 297. (Nevada.) = No. 640, adult, breeding plumage, after loss of occipital crest, the latter replaced by dusky-grayish patch.
33. *Thalassus caspius* var. *imperator*, COUES, Proc. Philad. Acad. 1862, 538, in text. (North America.) = No. 680.
34. *Sterna portlandica*, RIDGW. Am. Nat. viii. 1874, 433. (Portland, Maine.) = No. 687, juv., second year
35. *Sterna fuliginosa* var. *crissalis*, BAIRD, Pr. Boston Soc. xiv. 1872, 285. (Socorro I., N. W. Mexico.) = No. 681.

wing-bands are merely indicated. The bill is very characteristic. It is somewhat weaker at the base than in *L. hornemanni*, but longer and remarkably darker in all seven specimens.

"The bird figured by Dresser on the second plate (lower figure) belongs here, and is by no means the young of *L. hornemanni*, as supposed by Dresser."

[This description accords well in every particular with the dark summer stage of *Egiothus linaria holbölli*, described in 1861 by Dr. Coues as *E. rostratus*, the type of which came from Greenland.—R. R.]

*k. List of exotic species which have been attributed to North America by various authors, but apparently without sufficient evidence of their occurrence.\**

1. ANTHUS CERVINUS, Pall.—ZANDER, Jour. für Orn. Extraheft i. 1853, 64. (Aleutian Islands.)
2. *Geothlypis aquinoctialis* (Gmel.) Caban.—*Sylvia delafieldii*, AUD. Orn. Biog. v. 1839, 307 ("Oregon").—*Trichas delafieldii*, AUD. B. A. Am. ii. 1841, 81, pl. 103.—*Geothlypis velatus*, BAIRD, B. N. Am. 1859, 243; Cat. 1859, No. 171.
3. LANIUS LAHTORA, Sykes.—*Lanius elegans*, SWAINS. Faun. Bor. Am. ii. 1831, 122 (fur countries).—NUTT. Man. ii. 1832, 566. [Not *Collurio elegans*, Baird.]
4. *Progne leucogastra*, Baird.—*P. chalybea*, CASS. Illustr. 1856, 246 (California, *vide* J. G. Bell).
5. *Astragalinus yarrelli* (Aud.) Caban.—*Carduelis yarrelli*, AUD. Synop. 1839, 117 ("California"); B. Am. iii. 1841, 136, pl. 184.—*Chrysomitris yarrelli*, BAIRD, B. Am. 1858, 421; Cat. 1859, No. 312.
6. *Astragalinus barbatus* (Mol.) —.—*Carduelis stanleyi*, AUD. Synop. 1839, 118 ("California"); B. Am. iii. 1841, 137, pl. 185.—*Chrysomitris stanleyi*, BAIRD, B. N. Am. 1858, 420; Cat. 1859, No. 311.
7. HYPOLIA ARCTOA (Pall.) Ridgw.—*Leucosticte arctoa*, CABAN. Mus. Hein. i. 1851, 154 ("Russisch-America").—*Leucosticte arctous*, BAIRD, B. N. Am. 1858, 430; Cat. 1859, No. 324.
8. CARPODACUS HÆMORRHOUS (Licht.) ScL.—BAIRD, B. N. Am. 1858, 417, foot-note (North America?); Cat. 1859, No. 309.
9. LOXIA PITYOPSITTACUS, Bechst.—Cf. NUTTALL, Man. Orn. Land Birds, ed. 1832, 537 ("high northern regions of America", *vide* TEMMINCK).
10. "*Zonotrichia*" *pilcata* (Bodd.) —.—*Fringilla mertonii*, AUD. Orn. Biog. v. 312; B. Am. iii. 1841, 152, pl. 190 ("North California").
11. *Cynchramus schanielus* (Linn.) Boie.—*Emberiza schanielus*, NUTT. Man. Orn. Land Birds, ed. 1832, ii. 586 ("vicinity of Harrisburg in Pennsylvania", *vide* Audubon).
12. *Melanocorypha calandra* (Linn.) Boie.—*Alauda calandra*, LINN., SW. & RICH. F. B. A. ii. 1831, 244 ("fur countries"; spec. presented by the Hudson's Bay Co. said to be in the British Museum).—NUTT. Man. ii. 1832, 580.
13. *Trupialis militaris* (Linn.) Bp.—BAIRD, B. N. Am. 1858, 533 ("California"); Cat. 1859, No. 405.
14. ICTERUS MELANOCEPHALUS (Wagl.) Gray.—CASS. Illustr. 1856, 137, pl. 21 (Texas and New Mexico).—BAIRD, B. N. Am. 1858, 543 (not given as North American!); Cat. 1859, No. 410.
15. CALOCITTA COLLIEI (Vig.) Finsch.—"*Pica bullockii*, Wagl.", AUD. B. Am. iv. 1842, 105, pl. 229 ("woody portions of North California").—*Garrulus bullockii*, NUTT. Man. i. 1832, 230 ("Columbia R.").
16. *Tyrannus melancholicus*, Vieill.—BAIRD, B. N. Am. 1858, 176 (not given as North American); Cat. 1859, No. 129.
17. *Lampornis violicauda* (Bodd.) Elliot.—"*Trochilus mango*, Linn.", AUD. Orn. Biog. ii. 480; B. Am. iv. 1842, 186, pl. 251 ("Florida Keys").—*Lampornis mango*, BAIRD, B. N. Am. 1858, 130; Cat. 1859, No. 100.
18. CAMPEPHILUS IMPERIALIS (Gould) Gray.—*Picus imperialis*, AUD. Orn. Biog. v. 313; B. Am. iv. 1842, 212 ("Rocky Mountains and North California").—CASS. Illustr. 1856, 285, pl. 49.—BAIRD, B. N. Am. 1858, 82; Cat. 1859, No. 73.

\* This list does not include American species wrongly supposed by authors to be the same as European species, and so named, e. g. *Circus* "*cyaneus*" for *C. hudsonius*, *Regulus* "*cristatus*" for *R. satrapa*, *Troglodytes* "*parvulus*" or *T. "europæus*" for *T. hyemalis*, etc., etc., but only those which were through actual error (as it appears) wrongly attributed to North America. Species which are most likely to have occurred in North America are printed in small capitals; those whose occurrence would in any case be purely accidental are printed in italics.



19. HYLOTOMUS SCAPULARIS (Vig.) Ridgw.—"*Picus lineatus*, LINN.", AUD. Orn. Biog. v. 315; B. Am. iv. 1842, 233 ("Columbia River").
20. STRIX STRIDULA, Linn.—*S. aluco*, NUTT. Man. i. 1832, 135 (Newfoundland and Hudson's Bay).
21. CARINE NOCTUA (Scop.) Kaup.—"*Strix passerina*, LINN.", AUD. Orn. Biog. v. 269.—"*Surnia passerina*, Linn.", AUD. B. Am. i. 1840, 116 ("Pietou, Nova Scotia").
22. *Speotyto cunicularia* (Mol.) —.—*Athene cunicularia*, CASS. in Baird's B. N. Am. 1858, 60 ("North America, west of Rocky Mountains").
23. THALASSETUS PELAGICUS (Pall.) Kaup.—*Aquila pelagica*, PALL. Zoögr Rosso-As. i. 1811, 343 (Russian America, *fide* Steller).—*Haliaëtus pelagicus*, CASS. Illustr. 1856, 31, pl. 6; in Baird's B. N. Am. 1858; BAIRD, Cat. 1859, No. 40.
24. *Sarcorhamphus gryphus* (Linn.) Dum.—*Cathartes gryphus*, BONAP. Am. Orn. iv. 1833, 318, pl. 22.—NUTT. Man. i. 1832, 35.
25. GYPARCHUS PAPA (Linn.) Glog.—*Cathartes papa*, NUTT. Man. i. 1832, 40 ("from the 30th degree of north latitude to the 32d in the southern hemisphere").
26. CATHARTES BURROVIANUS, CASS. in Baird's B. N. Am. 1858, 6 ("Lower California"); BAIRD, Cat. 1859, No. 4. [*Cf.* RIDGWAY, Bull. Nutt. Orn. Club, v. April, 1880, 83.]
27. LOPHORTYX ELEGANS (Less.) Nutt.—*Ortyx elegans*, NUTT. Man. ed. 1840, i. 792 ("Upper California", *fide* Lesson).
28. BUTORIDES BRUNNESCENS (Gundl.) Baird.—BAIRD, B. N. Am. 1858, 677 (in text); Cat. N. Am. B. 1859, No. 494.
29. *Hæmatopus ater*, Vieill.—*Hæmatopus townsendii*, AUD. Orn. Biog. v. 1839, 247, pl. 427; B. Am. v. 1842, 245, pl. 326.—*Hæmatopus ater*, BAIRD, B. N. Am. 1858, 700; Cat. 1859, No. 514.
30. "TRINGA" PLATYRHYNCHA, Temm.—NUTT. Man. ii. 1832, 114 (Arctic America, *fide* Temminck and Bonaparte).
31. ACTODROMAS MINUTA (Linn.) Kaup.—*Tringa minuta*, SW. & RICH. F. B. A. ii. 1831, 385 (Nelson and Hayes Rivers; "seen abundantly in the autumn").—NUTT. Man. ii. 1834, 119.
32. ACTODROMAS TEMMINCKI (Leisl.) Ridgw.—*Tringa temmincki*, NUTT. Man. ii. 1832, 119 (Arctic America).
33. TOTANUS CALIDRIS (Linn.) Bechst.—SW. & RICH. F. B. A. ii. 1831, 391 ("Hudson's Bay"; spec. in British Museum).—NUTT. Man. ii. 1834, 155.
34. *Heliornis fulica* (Bodd.) —.—*H. surinamensis*, NUTT. Man. ii. 1832, 510 ("accidental visitor in the Middle States of the Union").
35. ANSER SEGETUM (Gmel.) Bonap.—NUTT. Man. ii. 1832, 348 (Canada and Hudson's Bay).
36. CAILINA MOSCHATA (Linn.) Caban.—*Anas moschata*, NUTT. Man. ii. 1832, 403 (Lower Mississippi and Gulf coast of U. S.).
37. CEDEMIA NIGRA (Linn.) Hen.—*Fuligula nigra*, NUTT. Man. ii. 1832, 423 ("coast of the United States").
38. MERGELLUS ALBELLUS (Linn.) Selby.—*Mergus albellus*, WILS. Am. Orn. iii. pl. lxxi. fig. 4 (New England and New York; numerous).—NUTT. Man. ii. 1832, 467.—AUD. Orn. Biog. iv. 350; B. Am. vi. 1843, 408, pl. 414 ("Lake Barataria, not far from New Orleans").
39. PHALACROCORAX GRACULUS (Linn.) Leach.—NUTT. Man. ii. 1832, 484 ("South of Greenland"; United States in winter).
40. *Phalacrocorax pygmaeus*, PALL.—NUTT. Man. ii. 1832, 487 (Northern North America, *fide* Bonaparte).
41. *Phalacrocorax africanus* (Gmel.) Dumont.—NUTT. Man. ii. 1832, 488 ("United States", *fide* Audubon).
42. LARUS FUSCUS, Linn.—NUTT. Man. ii. 1832, 302 (Greenland, Newfoundland, and Hudson's Bay).



43. *LARUS CAPISTRATUS*, Temm.—NUTT. Man. ii. 1832, 290 (Delaware R. and Chesapeake Bay).
44. *LARUS MINUTUS*, Pall.—SW. & RICH. F. B. A. ii. 1831, 426 (given on Sabine's authority).—NUTT. Man. ii. 1832, 289.—*Chroicocephalus minutus*, LAWR. in Baird's B. N. Am. 1858, 853.—BAIRD, Cat. 1859, No. 671.
45. *DIOMEDEA EXULANS*, Linn.—NUTT. Man. ii. 1832, 340 ("accidentally to the coasts of the central part of the Union").—LAWR. in Baird's B. N. Am. 1858, 821.—BAIRD, Cat. 1859, No. 630.
46. *PODICEPS CRISTATUS* (Linn.) Lath.—SW. & RICH. F. B. A. ii. 1831, 410 (throughout fur countries).—NUTT. Man. ii. 1832, 250.—LAWR. in Baird's B. N. Am. 1858, 893.—BAIRD, Cat. 1859, No. 703.
47. *TACHYBAPTES MINOR* (Linn.) Coues.—*Podiceps minor*, NUTT. Man. ii. 1832, 257 (Hudson's Bay).

1. *Partial list of foreign birds which have been introduced to the United States, and those which have been captured after escape from confinement.*

SPECIES INTRODUCED WITH A VIEW TO THEIR NATURALIZATION.\*

1. *PASSER DOMESTICUS* (Linn.) Leach. European House Sparrow. The attempted naturalization of this bird has proved decidedly successful. The case is so notorious that further comment is unnecessary.
2. *PASSER MONTANUS* (Linn.) Stephens. European Tree Sparrow. Has become naturalized in the vicinity of Saint Louis, Mo., but the history of its introduction is unknown. (See MERRILL, Bull. Nutt. Orn. Club.)
4. *ALAUDE ARVENSIS*, Linn. Skylark. Partially naturalized in the vicinity of Cincinnati, on Long Island, and perhaps other localities.
5. *COTURNIX COMMUNIS* (Linn.) Bonn. European Quail. Introduced to various localities in the Eastern United States, and partially naturalized.

SPECIES WHICH HAVE BEEN CAPTURED AFTER ESCAPE FROM CONFINEMENT.†

1. *AMADINA RUBRO-NIGRA*, —. Brunswick, Maine, March, 1879; Leslie A. Lee. (ALLEN, Bull. Nutt. Orn. Club, April, 1880, 119.) *Hab.* India.
2. *CRITHAGRA BUTYRACEA*, —. South Scituate, Mass., in midwinter. (BREWER, Proc. Bost. Soc. xx. 271.) *Hab.* South Africa.
3. *LIGURINUS CHLORIS* (Linn.) Koch. Lowville, Lewis Co., N. Y., March 19, 1878; R. B. Hough. (Cf. Bull. Nutt. Orn. Club, Apr. 1880, 119.) *Hab.* Europe.
4. *CARDUELIS ELEGANS*, Steph. Eastern Massachusetts, many captures. (ALLEN, Bull. Nutt. Orn. Club, Apr. 1880, 120.) *Hab.* Europe.
5. *SERINUS MERIDIONALIS*, Brehm. Western Massachusetts, in winter. (ALLEN, l. c.) *Hab.* Europe.
6. *CORVUS FRUGILEGUS*, Linn. Washington, D. C., August, 1879.

An example of this species was seen by me in August, 1879, in the grounds of the Agricultural Department in Washington. It was perched in a maple tree near one of the outbuildings, was very tame, and flew laboriously, as if very recently escaped from confinement. I am, as yet, ignorant of the history of this specimen, nor have I since seen it.

7. *CONURUS XANTHOGENIUS*, Bp. *Hab.* St. Thomas, West Indies.

An example of this species, shot in a grove near Washington, by Dr. D. W. Prentiss, is in the National Museum collection. Of course it was an escaped cage-bird.

8. *CHENALOPEX ÆGYPTIACA* (Linn.) Steph. Carnarsie, Long Island, Jan. 3, 1877. (AKHURST, Bull. Nutt. Orn. Club, ii. Apr. 1877, 52.) *Hab.* Southern Europe and Africa.

\* This list does not include domesticated birds.

† This list is, of course, very incomplete; it includes merely a few species, the records of whose capture I happen to have at hand. A more complete list would be desirable, but want of time forbids its compilation in the present connection.

Table of families of North American birds, showing number of genera and species of each according to the foregoing catalogue.\*

	Number of the cata- logue.	Number of gen- era.	Number of spe- cies.†
1. Tardidae .....	1-18	8	18 + 8 = 26
2. Cinclidae .....	19	1	1
3. [Luscinidae] .....	20	1	1
4. Saxicolidae .....	21-24	2	4
5. PTILOGONATIDÆ .....	25-26	2	2
6. Sylviidae .....	27-34	3	8 + 1 = 9
7. <i>Chamaidae</i> .....	35	1	1
8. Paridae .....	36-50	4	15 + 3 = 18
9. Sittidae .....	51-54	1	4 + 1 = 5
10. Certhiidae .....	55	1	1 + 1 = 2
11. Troglodytidae .....	56-68	9	13 + 9 = 21
12. Motacillidae .....	69-73	4	5
13. MNIOTILIDÆ .....	74-134	18	61 + 8 = 69
14. VIREONIDÆ .....	135-147	3	13 + 3 = 16
15. Laniidae .....	148-149	1	2 + 2 = 4
16. Ampelidae .....	150-151	1	2
17. Hirundinidae .....	152-158	6	7 + 1 = 8
18. CÆREBIDÆ .....	159	1	1
19. TANAGRIDÆ .....	160-164	2	5 + 1 = 6
20. Fringillidae .....	165-256	36	91 + 35 = 126
21. ICTERIDÆ .....	257-278	8	22 + 5 = 27
22. [Sturnidae] .....	279	1	1
23. Corvidae .....	280-298	9	19 + 7 = 26
24. [Alaudidae] .....	299-300	2	2 + 2 = 4
25. TYRANNIDÆ .....	301-331	11	31 + 2 = 33
26. COTINGIDÆ .....	332-333	2	2
27. TROCHILIDÆ .....	334-348	10	15
28. Cypselidae .....	349-352	3	4
29. Caprimulgidae .....	353-358	5	6 + 2 = 8
30. Picidae .....	359-380	10	22 + 10 = 32
31. MOMOTIDÆ .....	381	1	1
32. Alcedinidae .....	382-383	1	2
33. Trogonidae .....	384	1	1
34. Cuculidae .....	385-390	3	6
35. Psittacidae .....	391-393	2	3
36. Strigidae .....	394-411	12	18 + 11 = 29
37. Falconidae .....	412-452	23	41 + 12 = 53
38. CATHARTIDÆ .....	453-455	3	3
39. Columbidae .....	456-468	10	13
40. CRACIDÆ .....	469	1	1
41. MELEAGRIDÆ .....	470	1	1 + 1 = 2
42. Tetraonidae .....	471-479	6	9 + 7 = 16
43. Perdiciidae .....	480-485	5	6 + 3 = 9
44. Ardeidae .....	486-498	11	13
45. Ciconiidae .....	499-500	2	2
46. Ibiidae .....	501-504	2	4
47. Plataleidae .....	505	1	1
48. Hæmatopodidae .....	506-508	1	3
49. Streptopodidae .....	509-511	2	3
50. Charadriidae .....	512-523	7	12 + 2 = 14
51. Scolopacidae .....	524-562	21	39 + 4 = 43
52. Phalaropodidae .....	563-565	3	3
53. Recurvirostridae .....	566-567	2	2
54. Parridae .....	568	1	1
55. Rallidae .....	569-580	6	12 + 2 = 14
56. ARAMIDÆ .....	581	1	1
57. Gruidae .....	582-584	1	3

\* Families peculiar to America in small capitals; peculiar to North America in italics. Palearctic families not represented by a peculiar species in America are placed in brackets.

† The figures following the sign + denote the number of recognized races not distinguished by a separate number in the catalogue; those in the last column the total of species and races.

Table of families of North American birds—Continued.

	Number of the cata- logue.	Number of gen- era.	Number of spe- cies.
58. Phœnicopteridæ .....	585	1	1
59. Anatidæ .....	586-638	30	53 + 6 = 59
60. Tachypetidæ .....	639	1	1
61. Pelecanidæ .....	640-641	1	2
62. Phalacrocoracidæ .....	642-648	1	7 + 3 = 10
63. Plotidæ .....	649	1	1
64. Sularidæ .....	650-653	1	4
65. Phaethontidæ .....	654-655	1	2
66. Rhynchopsidæ .....	656	1	1
67. Laridæ .....	657-695	9	39 + 2 = 41
68. Stercorariidæ .....	696-699	2	4
69. Procellariidæ .....	700-728	15	29 + 2 = 31
70. Podicipitidæ .....	729-735	5	7 + 1 = 8
71. Colymbidæ .....	736-740	1	5
72. Alcidae .....	741-764	14	24 + 3 = 27

## SUMMARY.

Number of genera .....	379
Number of species .....	764
Number of subspecies .....	160

## CONCORDANCE.

No. of old cat- alogue.	No. of new cat- alogue.	No. of old cat- alogue.	No. of new cat- alogue.	No. of old cat- alogue.	No. of new cat- alogue.	No. of old cat- alogue.	No. of new cat- alogue.	No. of old cat- alogue.	No. of new cat- alogue.	No. of old cat- alogue.	No. of new cat- alogue.
1	454	35	427	69	387	102	336	135	315	167	74
2	453	36	428	70	388	103	340	136	316	167 <sub>a</sub>	74 <sub>a</sub>
3	455	37	429	71	386	104	339	137	318	168	88
4	—	38	430	72	359	105	338	138	321	169	75
5	414	39	449	73	—	106	337	139	320	170	122
6	414	40	—	74	360	107	349	140	325 <sub>a</sub>	171	—
7	417	41	451	75	360 <sub>b</sub>	108	350	141	325	172	120
8	415	42	452	76	361	109	351	142	326	173	121
9	419	43	451	77	361 <sub>a</sub>	110	352	143	324	174	118
10	413	44	425	78	364	111	353	144	322	175	119
11	412	45	423	79	363	112	354	144 <sub>a</sub>	323	176	123
12	412 <sub>a</sub>	46	434	80	362	113	355	145	327	177	123 <sub>a</sub>
13	420	47	394	81	366	114	357	146	328	178	77
14	433	48	405	82	367	115	357 <sub>a</sub>	147	330	179	76
15	431	49	402	83	368	116	358	148	1	180	79
16	431	50	402 <sub>b</sub>	84	368 <sub>a</sub>	116 <sub>a</sub>	356	149	5 <sub>b</sub>	181	81
17	432	51	395	85	369	117	382	149 <sub>a</sub>	5 <sub>a</sub>	182	78
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20	436 <sub>b</sub>	54	397	88	370	120	333	152	4	184	86
21	442	55	400	89	370	121	332	153	4 <sub>a</sub>	185	87
22	438	56	401	90	371	122	302	154	3	186	115
23	436	57	401	91	372	123	301	155	7	187	116
24	436 <sub>b</sub>	58	408	92	373	124	304	156	9	188	117
25	439	59	408	93	374	125	303	157	21	189	107
26	439 <sub>a</sub>	60	409	94	375	126	306	158	22	190	109
27	443	61	406	95	377	127	307	159	23	191	108
28	442	62	407	96	376	128	305	160	24	192	105
29	437	63	392	97	378	129	—	161	30	193	94
30	447	64	391	98	378 <sub>b</sub>	130	312	162	33	194	95
31	447	65	384	98 <sub>a</sub>	378 <sub>a</sub>	131	313	163	32	195	96
32	448	66	389	99	379	132	311	164	19	196	102
33	445	67	389	100	—	133	314	165	71	197	100
34	426	68	385	101	335	134	317	166	73	198	111

## Concordance—Continued.

No. of old cat- alogue.	No. of new cat- alogue.	No. of old cat- alogue.	No. of new cat- alogue.	No. of old cat- alogue.	No. of new cat- alogue.	No. of old cat- alogue.	No. of new cat- alogue.	No. of old cat- alogue.	No. of new cat- alogue.	No. of old cat- alogue.	No. of new cat- alogue.
199	112	259	15	318	172	378	254	440	295	500	503
200	99	259 <sub>a</sub>	15	318 <sub>a</sub>	172 <sub>a</sub>	379	255	441	294	500 <sub>a</sub>	504
201	98	260	13 <sub>a</sub>	319	173	380	244	442	296	501	505
202	101	261	13	320	179	381	245	443	297	502	—
203	93	261 <sub>a</sub>	13	321	178	382	246	444	288	503	515
204	97	262	56	322	175	383	247	445	456	504	516
205	110	263	59 <sub>a</sub>	323	174	384	251	446	457	505	523
206	90	264	58	324	—	385	250	447	458	506	522
207	91	265	60	325	186	386	249	448	459	507	517
208	113	266	60 <sub>a</sub>	326	187	387	248	449	462	508	520
209	103	267	61	327	188	388	252	450	464	509	521
210	114	268	67	328	189	389	243	451	460	510	513
211	124	269	68	329	189	390	244	452	466	511	511
212	126	270	63	330	190	391	237	453	465	512	507
213	125	271	63 <sub>a</sub>	331	191	392	238 <sub>b</sub>	454	467	513	508
214	127	272	63	332	193 <sub>a</sub>	393	238	455	468	514	—
215	127	273	65	333	193	394	238 <sub>a</sub>	456	469	515	509
216	132	274	35	334	194	395	241	457	470 <sub>a</sub>	516	510
217	128	275	55	335	193 <sub>b</sub>	396	240 <sub>b</sub>	458	470	517	566
218	129	276	55 <sub>a</sub>	336	196	397	240	459	471	518	567
219	130	277	51	337	197	398	239	460	472	519	565
220	161	278	51 <sub>a</sub>	338	198	399	257	461	472 <sub>a</sub>	520	564
221	164	279	52	339	199	400	258	462	479	521	563
222	163	280	53	340	200	401	261	463	478 <sub>a</sub>	522	525
223	162	281	54	341	201	402	261 <sub>a</sub>	464	477	523	526 <sub>a</sub>
224	160	282	27	342	202	403	262	465	473	524	527
225	154	283	28	343	231 <sub>c</sub>	404	260	465 <sub>a</sub>	473 <sub>a</sub>	525	527 <sub>a</sub>
226	153	284	29	344	204	405	—	466	473 <sub>b</sub>	526	529
227	155	285	36	345	206	406	263	467	474	527	535
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229	157	287	38	347	208	408	265	469	476	529	540
230	158	288	39	348	205	409	266	470	475	530	539 <sub>a</sub>
231	152	289	41 <sub>a</sub>	349	209	410	—	471	480	531	534
231 <sub>a</sub>	152 <sub>a</sub>	289 <sub>a</sub>	41 <sub>a</sub>	350	222	411	268	472	480 <sub>b</sub>	532	538
232	150	290	41	351	221	412	267	473	481	533	536
233	151	291	41 <sub>b</sub>	352	218	413	269	474	482	534	542
234	26	292	43	353	220	414	270	475	483	535	541
235	25	293	42	354	217	415	271	476	484	536	528
236	148	294	40	355	224	416	272	477	485	537	552
237	149	295	46	356	225	417	273	478	582	538	547
238	149 <sub>a</sub>	296	45	357	210	418	274	479	583	539	548
239	—	297	49	358	214	419	275	480	584	540	549
240	135	298	47	359	211	420	277	481	581	541	550
241	136	299	48	360	212	421	278	482	491	542	553
242	—	300	50	361	213	422	278 <sub>a</sub>	483	491	543	557
243	137	301	159	362	215	423	280	484	492	544	554
244	138	302	300	363	231	424	280	485	490	545	555
245	139	303	165	364	231 <sub>b</sub>	425	281	486	489	546	556
246	145	304	166	365	231 <sub>c</sub>	426	282	486 <sub>a</sub>	489	547	553
247	142	305	168	366	231 <sub>d</sub>	427	282 <sub>a</sub>	487	487	548	545
248	143	306	168 <sub>a</sub>	367	231 <sub>a</sub>	428	282 <sub>b</sub>	488	486	549	558
249	144	307	169	368	234	429	283	489	486	550	559
250	141	308	170	369	233	430	284	490	493	551	560
251	141 <sub>a</sub>	209	—	370	226	431	285	491	498	552	569
252	140	301	184	371	228	432	286	492	497	553	571
253	11	311	—	372	230	433	287	493	494	554	572
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257	16 <sub>a</sub>	316	183	376 <sub>a</sub>	235 <sub>b</sub>	438	292	498	502	559	586
258	17	317	185	377	256	439	291	499	501	560	578

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No. of old cat- alogue.	No. of new cat- alogue.	No. of old cat- alogue.	No. of new cat- alogue.	No. of old cat- alogue.	No. of new cat- alogue.	No. of old cat- alogue.	No. of new cat- alogue.	No. of old cat- alogue.	No. of new cat- alogue.	No. of old cat- alogue.	No. of new cat- alogue.
561	578	589	615	620	642	651	706	681	679	710	741
561 <sub>a</sub>	588	590	616	621	648	652	696	682	680	711	742
562	589	591	618	622	643 <sub>b</sub>	653	697	683	681	712	745
563	591	592	617	623	643	654	698	684	682	713	744
563 <sub>a</sub>	591 <sub>a</sub>	593	620	624	643 <sub>a</sub>	655	699	685	683	714	743 <sub>a</sub>
564	590	594	619	625	644	656	660	686	685	715	743
565	593 <sub>a</sub>	595	621	626	645	657	662	687	684	716	745
566	593 <sub>a</sub>	596	622	627	646	658	661	688	681	717	746
567	594	597	623	628	649	659	662	689	686	718	746
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569	594 <sub>a</sub>	600	624	631	701	662	664	692	688	721	749
570	595	601	632	632	702	663	668	693	687	722	750
571	596	602	633	633	703	664	669	694	690	723	750
572	597	603	633	634	704	664 <sub>a</sub>	670	695	693	724	751
573	598	604	630	635	705	665	670	696	695	725	747
574	599	605	632	636	705 <sub>a</sub>	666	672	697	656	726	760
575	600	606	627 <sub>a</sub>	637	706	667	673	698	736	727	761
576	601	607	628	638	717	668	674	699	738	728	762
577	602	608	629	639	719	669	674	700	739	729	763
578	605	609	634	640	726	670	675	701	740	730	763
579	612	610	635	641	727	671	—	702	731	731	764
580	611	611	636	642	723	672	658	703	—	732	755
581	609	612	637	643	724	673	674	703 <sub>a</sub>	731	733	755
582	610	613	638	644	722	674	659	704	729	734	759
583	608	614	—	645	721	675	659	705	730	735	756
584	604	615	640	646	728	676	657	706	732	736	753
585	607	616	641	647	709	677	657	707	733 <sub>a</sub>	737	754
586	606	617	650	648	714	678	676	708	733	738	752
587	613	618	652	649	711	679	678	708 <sub>a</sub>	734		
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ON THE IDENTITY OF THE GENUS *LEURYNNIS*, LOCKINGTON,  
WITH *LYCODOPSIS*, COLLETT.

By THEODORE GILL.

In the Proceedings of the Zoological Society of London for 1879 (at pp. 380-381) Mr. Robert Collett has published a communication "On a fish of the genus *Lycodes* from the Pacific." The article was read at the meeting held April 1, 1879, and published in the part (II) issued August 1, 1879.

In this article Mr. Collett describes at length the species referred to, under the name *Lycodes pacificus*, and gives a figure of the head and anterior part of the body. The diagnosis is as follows:

"Vomerine and palatine teeth none. Coloration uniform yellowish grey. The body is scaly, the head and pectorals naked. The head is contained four and six-tenths, the height of the body nine times, in the total length. Lateral line very indistinct.

"M. B. 6; D. (circa) 92; A. 71; C. (circa) 1, 1; P. 18.

"*Hab.*—Japan (*Mus. Berol.*)."

At the end of the description Mr. Collett expresses the following opinion:

"The absence of vomerine and palatine teeth, a character quite peculiar to the species, will perhaps necessitate its removal to a separate genus, for which I propose the name *Lycodopsis*."

In the Proceedings of the United States National Museum for 1879 (at pp. 326-332) Mr. W. N. Lockington has given "Descriptions of new genera and species of fishes from the coast of California." The signature in which it appears was issued March 25, 1880.

In this article Mr. Lockington describes what is considered to be a new generic type, under the name *Leurynnis paucidens*. The diagnosis of the genus is as follows:

"*Generic characters.*—Family *Zoarcidae*, allied to *Lycodes*. Ventral fins present, short; no teeth on vomer and palatines; dorsal and anal fins continued without interruption around the tail; scales small, but evident. The name is from *λευρός*—smooth; *ῥινις*—vomer, in allusion to the character which chiefly distinguishes the genus from *Lycodes*."

Selecting characters to compare with those mentioned in Mr. Collett's diagnosis, we have the following:

"No vomerine or palatine teeth.—Color olivaceous, the scales lighter than the skin; the color formed by numerous dark points, which are continued also upon the head. Upper surface of head darker, abdominal surface lighter than other portions. Vertical fins margined with black.—Scales roundish, smooth, separate, imbedded in the skin, uniform over the whole of the body, except upon an area on the upper surface in front of the dorsal, where they are smaller, and region near base of pectorals scaleless. Head scaleless—the ridges somewhat prominent.—



Length of head  $4\frac{1}{3}$ – $4\frac{2}{3}$  times in the total length.—Greatest depth of body from a little more than ten to a little less than eleven times.—No lateral line."

M. B. 6; D. 90; A. 70; P. 18.

As will be thus seen, the two fishes are certainly congeneric, and are evidently very closely related. Even the slight discrepancies are apparently such (as in the case of the color) as result from difference of interpretation of the same characters. The vertical fins in the Californian form, however, are distinctly said to be "margined with black," while in the Japanese form it is at least implied that they are not. It is quite probable, nevertheless, that even these alleged differences may be found to be rather of degree than of kind. In view, however, of the difference of distribution, it is reasonable to suppose that the two forms will be found to be distinct, and, as the genus appears to be perfectly valid, they will rank as species, with the following names:

1. *LYCODOPSIS PACIFICUS*.

*Lycodes pacificus* Collett, Proc. Zool. Soc. London, 1879, p. 381.

*Hab.*—Japan.

2. *LYCODOPSIS PAUCIDENS*.

*Lecrurnis paucidens* Lockington, Proc. U. S. Nat. Mus. 1879, p. 326.

*Hab.*—California.

**DESCRIPTION OF A NEW CHIROID FISH, MYRIOLEPIS ZONIFER, FROM MONTEREY BAY, CALIFORNIA.**

**By W. N. LOCKINGTON.**

*Myriolepis*, gen. nov. (*Chiridae*).

Body oblong, rather stout; mouth moderate; cardiform teeth in both jaws, slightly larger anteriorly; no canines; teeth on vomer and palatines; preopercle entire; no spines about the head. Gill-openings separated by a narrow isthmus; gill-rakers short. Branchiostegals seven. Pseudobranchiæ present. Dorsal fins two, united at base, the first with about 14 rather stiff spines, the second with as many soft rays. Anal short, of about 13 rays, without distinct spine. Scales very small, ctenoid, covering the whole surface of the body and head and the greater portion of all the fins except the first dorsal. Lateral line single.

Etymology: *μυρίον*, myriad; *λεπίς*, scale.

This genus bears little resemblance to any of the previously known *Chiridae*, its general appearance being quite *Serranoid*. It has, however, a bony stay connecting the suborbital and preoperculum, and possesses the technical characters of the *Chiridae*, in which group it should form a distinct subfamily, differing especially in the shorter anal fin without distinct spines.

*Myriolepis zonifer*, sp. nov.

Lower jaw slightly projecting; snout to summit of ascending process of premaxillary inclined backwards at about  $45^{\circ}$ ; forehead slightly con-

cave longitudinally; dorsal outline, from occiput to caudal peduncle, regularly arched, the highest point at anterior part of first dorsal; mandible straight; abdominal outline regularly curved.

Greatest depth  $3\frac{8}{13}$  times, depth of caudal peduncle 12, length of head  $3\frac{9}{10}$ , length of pectoral  $4\frac{11}{12}$  in total length to extremity of caudal fin; orbit (longitudinal diameter)  $5\frac{1}{5}$ , mandible  $2\frac{1}{3}$ , interorbital width about  $2\frac{9}{10}$  in length of head.

Gape straight, maxillary extending to a little in front of the center of the pupil, its upper edge received in a groove below the preorbital for most of its length.

Teeth of mandibles and intermaxillaries slender, sharp, recurved; in several rows in front, gradually diminishing laterally to a single row; front teeth slightly longer than lateral teeth. A few similar but smaller teeth on vomer and palatines. Upper pharyngeals with a cushion of similar teeth; lower pharyngeals slender, with a patch of similar teeth in the form of a very obtuse triangle, the internal row largest.

Gill-rakers short, ciliated, those on the anterior aspect of the first pair of gill-arches longer than the others.

Branchiostegals seven; gill-membranes continuous below, but attached to an isthmus throughout the entire length of their junction except the posterior margin.

Nostrils just above a line joining the upper margin of the orbit with the tip of the snout, simple, elliptical, the posterior far the larger.

Eyes lateral, subelliptical, the upper margin of the orbit less curved than the lower; interorbital space wide, slightly convex transversely.

Longitudinal diameter of orbit  $1\frac{1}{3}$  in length of snout.

Opercular bones without spines or denticulations.

Pectoral base vertical; pectoral broadly lanceolate, the upper margin curved; 5th ray longest; 4th, 6th, 7th, and 8th only slightly shorter, thence diminishing rapidly downwards. Tip of pectoral about vertical with base of 11th ray of spinous dorsal, but considerably short of the vent. Rays twice branched.

Ventrals inserted a little behind pectorals, their length  $1\frac{2}{5}$  in that of the pectorals. Rays twice bifurcate.

Spinous dorsal commencing about opposite 20th scale of lateral line; first spine very short; 2d and 3d rapidly increasing; 4th longest; thence diminishing regularly to 12th; 13th and 14th directed backwards, horizontal, their points only free; 15th spine at base of 1st soft ray.

Third ray of soft dorsal longest, thence diminishing regularly; rays split up at tips.

Anal commencing about opposite base of 7th ray of 2d dorsal, and preceded by two weak spines hidden in membrane. First soft ray longest; rays split at tips.

Caudal with many accessory rays and about sixteen principal rays, so that its lateral margins are convex; posterior border somewhat emarginate; rays much divided at tips.

Lateral line continuous to end of caudal peduncle, not very conspicuous; tubes simple. From its origin to above the pectoral it curves downwards, thence follows parallel to the dorsal outline till it reaches the caudal peduncle, along which it is median.

Scales of body small, strongly etenoid, larger upon hinder part of trunk and on caudal peduncle than anteriorly, and smallest on head and under pectoral base. Scales elongate, almost rectangular, but with the free margin convex, imbedded portion striated. Entire surface of gill-covers, branchiostegal rays, mandibles, maxillaries, preorbitals, and snout scaly, the only scaleless portions being the lips and the portions of the gill-membrane folded up between the rays. A shallow, scaleless groove at sides of 1st dorsal.

The vertical fins, except the spinous dorsal, covered almost to the tips of the rays with similar but smaller scales, and the paired fins similarly covered on their exterior surfaces.

A band of small scales along some of the anterior spines of the 1st dorsal.

Dorsal region and head, to the level of the upper margin of maxillary and of pectoral fin, black; four broad transverse black stripes between pectorals and caudals.

The spaces between these bands, the abdomen, and the lower part of the head white.

The 1st band is at about the center of the length of the pectoral, and fades out level with the lower margin of that fin; the 2d is anterior to the vent, and almost encircles the body; the 3d continues to the anal base, but is much lighter on its lower portion; while the 4th encircles the caudal peduncle.

A 5th but narrower black band encircles the caudal base, and two black bands cross the caudal, the posterior one broadest; rest of caudal white. All the other fins banded or blotched irregularly with black and white, the former predominating. The etenoid tips of the scales are white.

I have only seen a single specimen of this fish. Before the description was written it was exposed to alcohol for about two months.

It was obtained in San Francisco market August, 1879, and was taken in Monterey Bay.

In appearance it somewhat resembles some of the small-scaled *Serranidae* or *Rhyptiidae*. The presence of a suborbital stay, however, shows that its affinities are really with the *Chiridae*.

*Dimensions of type (No.*

*United States National Museum).*

	Inches.
Total length, to tip of caudal.....	11.75
Greatest depth, about.....	3.25
Greatest thickness, at opercles.....	1.72
Depth of caudal peduncle, about.....	.98
Length of head.....	3.02
Interorbital width.....	1.05
Length of snout.....	.77

	Inches.
Longitudinal diameter of orbit.....	.58
Length of lower jaw, in straight line.....	1.42
Length of upper jaw, in straight line.....	1.15
Tip of snout to insertion of pectoral, about.....	3.00
Tip of snout to origin of dorsal, along axis of fish.....	3.62
Tip of snout to origin of dorsal, along dorsal profile.....	4.03
Tip of snout to origin of anal, along axis of fish.....	6.45
Tip of lower jaw to insertion of ventrals, along abdominal profile.....	3.32
Width of pectoral base.....	.90
Length of pectorals.....	2.40
Length of ventrals.....	1.50
Length of base of 1st dorsal to XIIth spine.....	2.08
Height of longest (4th) dorsal spine.....	1.25
Length of base of 2d dorsal.....	2.60
Height of longest (3d) ray of dorsal.....	1.44
Length of base of anal.....	1.62
Height of longest (1st) ray of anal.....	1.38

*Fin formula*.—B. 7; D. XII + 11,  $\frac{1}{15}$ ; A.  $\frac{2}{11}$ ; P. 18; V.  $\frac{1}{5}$ ; C. lat. line circa 128–134.

#### DESCRIPTION OF A NEW SPECIES OF RAY, *RAIA RHINA*, FROM THE COAST OF CALIFORNIA.

By DAVID S. JORDAN and CHARLES H. GILBERT.

*Raia rhina*, sp. nov.

Disk rather broader than long, the snout very sharp and long-acuminate. Outer angle of pectoral sharp; posterior edge of pectoral nearly straight. Region from pectoral angle to snout slightly convex, then almost uniformly and *strongly concave* to near the tip of the snout, which tapers to a sharp point. A straight line from the snout to the tip of the pectoral passes far from the edge of the disk. Length of snout nearly four times the interorbital width.

Interorbital space quite narrow, very little concave, somewhat depressed in the middle. Nasal ridges separated for more than half their length. Supraocular ridges slightly elevated. Eyes larger and much longer than spiracles. Ventral fins deeply emarginate. Caudal fin reduced to a small fold. Dorsal fins moderate, rather close together, the interspace less than the base of the fin.

*Female* with the spines on the body moderately strong, arranged as follows:

Five or six rather strong spines above the eyes. Two in front of the center of the back. None along the middle line of the back until opposite the *posterior end of the ventrals*, where a median series begins on the tail. A lateral caudal series on each side, and two or three long sharp spines between the dorsal fins.

Roughnesses on the skin above rather large, sharp-pointed, and evidently stellate. Those on the snout especially conspicuously stellate and larger than the others. These prickles are *everywhere present* on the



upper parts of the body, but they are not evenly distributed, and in most regions they are placed quite wide apart. They are largest and most numerous on the nasal ridges, interorbital space, middle region of back and tail, and anterior part of pectorals. On the base and edges of the pectorals and on the ventrals the prickles are few and small. On the middle portion of the pectorals they are rather numerous. Under-side of disk everywhere prickly except along the edges of the fins; the prickles largest under the snout.

Male not seen, probably differing, as in the other species, in the sparser prickles above, in the absence of a lateral caudal series, and in the presence of stouter prickles on the anterior part of the pectorals and of claw-like spines on the posterior part. Mouth somewhat arched. Teeth about  $\frac{46}{40}$ . Nasal flap rather less than half the width of the mouth.

Coloration essentially as in *Raia binoculata*. Light brown above, vaguely mottled with paler; the usual dark ring at the base of the pectorals most distinct in fresh examples, and probably in the young.

This species is known to us from three examples. Adult females, 26 to 29 inches in length. One from Monterey Bay and two from San Francisco Bay. The one from Monterey was referred to in our description of *Raia stellulata* as a long-nosed form or variety of *Raia binoculata*.

*Raia rhina*, is related to *Raia cooperi* and *Raia binoculata*. From the latter it differs in the much sharper and longer snout, in the less concave interorbital space, and in the much greater roughness of the body, the small prickles, even in the female of *R. binoculata*, being confined to the snout, interocular space, and a portion of the median region of the back and the tail, the fins being perfectly smooth. The male has the usual patches on the pectoral fins, and the back almost or quite smooth.

From *Raia cooperi*, *Raia rhina* differs in the much smaller size in length, the adult of *Raia cooperi* reaching at least a length of more than six feet. It also differs in form, color, interorbital width, armature, &c., as will appear from the following description of a young male example of *Raia cooperi*, 27½ inches in length, from San Francisco.

Disk broad, its widest part much behind the middle, the pectoral angle rather sharp, and the posterior edge very little convex. The anterior margin of the pectoral is at first slightly convex, then concave, then, opposite the eyes, again very slightly convex, then again slightly concave; the snout itself not very sharp, although long.

Interorbital space very broad and almost flat (deeply concave in *R. binoculata*), only slightly depressed in the middle, the nasal ridges well separated for usually two-thirds their length. Supraocular ridge not at all elevated. Eyes quite small, shorter than the spiracles.

Ventral fin not deeply emarginate (becoming more deeply emarginate in the adult). Caspers, in this example (which, although larger than the adults of the other species, is evidently immature), very small, scarcely exerted beyond the ventral edge. Claw-like pectoral spines not yet developed. Caudal fin wanting. Dorsal fins moderate, not far



apart, the interspace less than the length of the base. Tail with a slight lateral fold.

Spines on body small and few. Two or three very small ones over the eye, one at the center of the back, with a minute one in front of it. None along the median line of the back, the median caudal series beginning at the base of the ventrals. These spines are quite small, but grow larger backward.

Asperities above in the form of minute prickles, somewhat stellate. These are very minute, except along the median line of the back and tail, and there they are smaller than in *R. stellulata* or *R. rhina*. Tail entirely prickly above. A broad band of prickles along back to interorbital space. Entire pectoral fin minutely prickly, rather coarsely so anteriorly. Nasal ridges prickly.

Ventrals mostly covered with minute prickles, as is the under side of the snout and the region around the mouth. A row of rather coarser prickles along the edge of the disk anteriorly, on the under side.

Jaws rather strongly curved. Teeth somewhat tricuspid,  $\frac{4}{3}$ .

Length of nasal flap about half the width of the upper jaw.

Body light brown, with many rather large, faint, round whitish spots, which are very distinct in the young. A vague blackish ring at base of pectoral.

*Raia cooperi* is rather common from Monterey Bay to Vancouver's Island, and probably north to Alaska. It is often brought into the markets of San Francisco with the *binoculata*. We have seen examples of all sizes from six inches to six feet in length. A skin of an individual six feet in length was obtained by us at Victoria. In its stomach were two specimens of *Cottus polyacanthocephalus*, each a foot long. Thus far no examples of any of the other species over  $2\frac{1}{2}$  feet in length have been noticed.

Table of measurements.

	<i>R. rhina</i> ♀, Monterey.	<i>R. rhina</i> ♀, San Francisco.	<i>R. cooperi</i> ♂, juv., San Francisco.	<i>R. binoculata</i> ♂, Monterey.	<i>R. binoculata</i> ♀.	<i>R. binoculata</i> ♂, San Francisco.	<i>R. stellulata</i> ♀, Monterey.
Extreme length, in inches.....	28.80	26.25	27.65	21.6	23.45	24	17.45
Length of disk, in inches=100.....	18.40	16.85	17.3	13	14.90	13.65	10.10
Disk, greatest width.....	103	111	119	106	113	113	121
Width midway between snout and mouth.....	14			16.7			41
Width at front of eyes.....	41			45.5			58
Distance from snout to pectoral angle.....		77.5	86.5		78.5	77	
Distance from snout to first gill-opening.....				50.5			
Distance from snout to mouth.....	39	29.5	24	2.5	25	21	24
Distance from first to last gill-opening.....	12	17	13.5	12.8			14
Width of mouth.....	15.5	14.5	15.5	15	15.5	15.5	18
Distance between nostrils.....		13.2	15		13.5	12.5	
Diameter of orbit.....	5.5	6	5	5.5	7.5	7	8
Length of snout from eye.....	31	30.5	28.5	23	27.3	23.5	23
Length of nasal flap.....		7			8.5	8	
Distance between first gill-openings.....	26.3	25.5		25.5	26.5	25	31.5
Distance between last gill-openings.....	16.5	17	17.5	14.3	16.5	15	18
Interorbital width.....	8	8	10.5	8	7.5	7.8	8
Tail, length.....	57	55	60	67	56.5	80	71.5
Distance between dorsals.....	3	3.5	3	3.8		10.5	5

NEEAH BAY, WASH., May 31, 1880.

**DESCRIPTION OF A NEW SPECIES OF PARROT OF THE GENUS  
CHRYSHOTIS, FROM THE ISLAND OF DOMINICA.**

**By GEORGE N. LAWRENCE.**

*Chrysotis nichollsi*.

MALE ?—The general color of the plumage is grass-green, darker above and on the breast and abdomen tinged with yellow; the feathers of the hind neck and back are bordered rather narrowly with black, those of the wing coverts are without the black borders; the feathers of the lower part of the throat, of the upper part of the breast, and of the sides of the neck change to verditer-green on a side view and are edged with black; the bases of some of the feathers of the breast and abdomen are dull red, and they are just perceptibly edged with black; the sides are dark green; the fore part of the head as far as upon a line with the anterior angle of the eye, lores, sides of the head, and the throat are of a medium shade of ultramarine-blue, lighter in color on the throat; in some lights the blue color has a grayish cast; the feathers of the top of the head are varied with bright green and azure blue and are narrowly bordered with black; the primaries have their inner webs black, the first primary is entirely black, the second and third have their outer webs dark blue for three-quarters their length, terminating with black, the other primaries have their outer webs green for most of their length, passing into dark blue for a short space, and ending with black; the extreme ends are narrowly margined with whitish ash; the wing speculum is of a bright scarlet red, occupying a space on the outer webs of the first three secondaries of about three inches; there is a small yellow mark where the red joins the terminal dark blue of these feathers, which have the outer webs green at their bases; the other secondaries have their outer webs green, with a subterminal blue spot, and ending with black; the fourth secondary has an elongated yellow mark on the middle of the outer web; all the secondaries have their inner webs black; the outer webs of the tertiaries are green, the inner are black with their ends green; the wing coverts are of the same color as the back, but the concealed portions of the inner webs of the greater coverts are black; the outer edge of the wing is dull light yellow; the quills underneath have the basal two-thirds of their length dull verditer-blue, the terminal portion is black; the under wing coverts are green; the first outer tail feather has the outer web dark blue for two-thirds its length, the terminal third is greenish yellow; the inner web is scarlet at the base for nearly half its length, which color is separated from the yellowish end by a space of dull green; the second, third, and fourth feathers differ from the first only in having the basal parts of their outer webs green; the central tail feathers are dark green, ending with dark yellowish green; upper tail coverts dark green, with their ends yellowish; the under tail coverts are yellowish green; the upper mandible is whitish-

horn color, with the sides yellowish, the under is grayish-horn color, yellowish at the base; feet blackish.

Length (skin) from end of upper mandible over the culmen, 20 inches; from top of head, 18 inches; wing,  $9\frac{3}{4}$ ; tail,  $6\frac{3}{4}$ ; tarsus, 1.

*Habitat*.—Dominica, West Indies.

Type in National Museum, Washington, received from Dr. H. A. Alford Nicholls.

Dr. Nicholls sent a second specimen in spirits, which was made into a skin, and on dissection proved to be a female. It does not differ materially in plumage from the other specimen, the blue of the face only appearing a little duller. It is rather smaller; the bill and feet are weaker. From a comparison of the two I think the specimen specially described is a male.

This new species in some respects resembles *C. cyanopsis* (Vieill.), said to be from the Antilles, but the precise locality not known, and *C. bouqueti* (Bechat), from St. Lucia, all having blue heads. The first, *C. cyanopsis*, is described as having the face dark ultramarine-blue, but it differs from the new species more especially in the top of the head and the chin being dark blue, the throat and entire under surface wine-red, and the larger wing coverts dark indigo-blue, besides minor differences. In dimensions they are much the same.

I have a fine specimen of *C. bouqueti* before me belonging to the Museum of Comparative Zoology, Cambridge, and kindly loaned by Professor Allen. In this the blue is nearly of the same shade as in the new species; it is a little lighter in color on the front, but the blue does not extend so far down on the throat, the lower part of which is scarlet; the breast and abdomen are vinous red intermixed somewhat with green; the color above is a lighter green; the black borders to the feathers of the hind neck and back are broader; the colors generally are much brighter; it is a smaller species, with weaker feet and a blackish bill; it measures from the end of the upper mandible  $16\frac{1}{2}$  inches, though the wings and tail fully equal in size those of *C. nichollsi*.

I have named this fine species as a well-merited compliment to Dr. Nicholls for his assiduous endeavors to supplement Mr. Ober's work in Dominica.

The specimens of *Chrysotis* were sent in March, 1879, with some other species, to Martinique, to be forwarded to the Smithsonian, but they remained there for about twelve months, and were not received in Washington until May of this year. Dr. Nicholls wrote Professor Baird at that time concerning the parrot as follows:

"The '*Ciceru*' (not '*Vicero*') parrot.

"The bird was shot at Campbell, and was bought in the market, where it was exposed for sale as food. The feathers were off the neck when bought. Skin was firmly adherent to a thick layer of fat. The specimen is scarcely worth sending. I do so, however, as the feathers near the head are a different color to those of the *Vicero* parrot."

The other birds sent were as below, to which are added Dr. Nicholls's notes:

1. *EUPHONIA FLAVIFRONS* (Sparm.).

"Bird caught at head of Roseau Valley; never seen in the island until lately. Feathers of breast curl up over the wings when the bird is at rest, and during sleep the bird is rolled up like a ball."

2. *MYIADESTES GENIBARBIS*, Sw

"Sifflem montagne."

3. *ELAINEA MARTINICA* (Linn.).

"Caught in Roseau; white feathers on head very conspicuous when bird at rest."

4. *EREUNETES PETRIFICATUS* (Ill.).

"'Bécass;' common at the mouths of the rivers during the hurricane months."

5. *CHARADRIUS VIRGINICUS*, Borkh.

"'Oiseau marine.' Shot in plowed land near to Roseau in November, 1878."

6. *TRINGA MACULATA*, Vieill.

"'Bat-ma.' Caught in December, 1878, near to the mouth of the Roseau River."

Professor Baird has lately received from Dr. Nicholls a letter, dated 25th May, 1880, with another consignment of birds, of which I give the names and the notes of Dr. Nicholls thereon:

1. *CHRYBOTIS NICHOLLSI*, Lawr.

"The green parrot which I have been so long trying to obtain. It is now scarce and is seldom seen away from the deepest woods of the widest part of the island. It builds its nest in the forks of the highest forest trees, and it is usually seen in flocks. It is called by the natives 'perroquet,' which is simply French for parrot. As an example of the difficulty in obtaining this parrot I may mention that although I offered a good reward for a dead specimen I failed to get one. The specimen now sent was shot by a friend of mine; it was evidently a bird which had strayed from a flock."

Dr. Nicholls says of it in his letter: "It may possibly turn out to be the 'green parrot' which Mr. Ober failed to obtain."

I infer from the above that Dr. Nicholls considered this to be different from those sent a year ago, as in his letter of that date he says: "I am sorry to say that I have been unable to obtain specimens of the green parrot, but I hope to be successful before long."

This specimen, however, only differs from the type of *C. nicholli* in being smaller, with a weaker bill, which is quite dusky in color.

Dr. Nicholls may be correct in his suggestion that it is the "parrot" No. 33 of the Dominica catalogue. If so, Mr. Ober must have been misled as to its size, which he states to have been that of the Carolina parrot.



## 2. NYCTIARDEA VIOLACEA (Linn.).

“‘Crabier montagne.’ Caught in a dark ravine in the mountains near Roseau and brought to me alive. I kept it for more than a week, feeding it on cray-fish and land-crabs, which it devoured with avidity. It died suddenly.”

## 3. CHARADRIUS VIRGINICUS, Borkh.

“Golden plover. Shot on sea-beach.”

## 4. ANOUS STOLIDUS (Linn.).

“‘Twa-oo.’ Brought to me alive when very young and I kept it alive for nearly a year, when it was choked by a careless child. It became very tame. It used to fly on to the roof of my house and bathe in a duck-pond in the garden. I gave it fish cut into small pieces.”

## 5. STRIX FLAMMEA var NIGRESCENS, Lawr.

“Owl. It is, I think, different in plumage and certainly smaller than one I had some years ago. This bird was caught in the town of Roseau and brought to me. I kept it alive for several weeks, when it died suddenly. It woke up usually just before dark and then partook of its meal of five or six small lizards or a mouse. On introducing a live lizard into its cage it darted down upon it with great quickness; it seemed to be more of a spring and a drop than anything else; it then held the animal in its claw for a minute or so and regarded it intently, then with its sharp beak it divided the spinal column just behind the head. This occurred once and again, and it would thus appear that the owl is endowed with the instinct of the easiest and surest way of killing its prey. The lizard when dead was seized by the head, and by a series of jerks or turnings up of the head the owl actually threw it down its throat. If the lizard was rather large the owl would rest for a while with the tail of the reptile hanging out of its mouth.”

I think this specimen is a male; the larger one spoken of was probably a female.

## 6. TRINGA MINUTILLA, Vieill.

“‘Bécass.’ Caught near to the mouth of Roseau River.”

NEW YORK, *June 15, 1880.*

## THE EULACHON OR CANDLE-FISH OF THE NORTHWEST COAST.

By JAMES G. SWAN.

This paper I have prepared from my own notes made during a cruise on the United States revenue-steamer Oliver Wolcott to Alaska, during the summer of 1873, as special commissioner to procure articles of Indian manufacture for the National Museum, to be exhibited at the Centennial celebration at Philadelphia, and from information derived from Mr. Robert Tomlinson, clerk to Kincoeth Mission, Nass River, British Columbia; from Mr. Charles F. Morrison, chief trader Hudson's Bay



Company, at Fort Simpson, British Columbia; and from reports of Rev. Mr. Duncan, of Metlakatla Mission, British Columbia, made to the Church Missionary Society, at London, and to Messrs. Langley & Co., Victoria, to whom I am indebted for the copy of Professor Redwood's report, which I give entire. The description of the Eulachon by Sir John Richardson is, I believe, the earliest, and but little can be added to it. As I have no copy of his works at hand I cannot give his description, which I regret.

JAMES G. SWAN.

NEAH BAY, *Clallam County, Wash., January 31, 1880.*

This fish, known to scientists as the *Thaleichthys pacificus*, and also as *Osmerus pacificus*, resembles the common smelt in size and general outward appearance, and is found on Puget Sound occasionally with the sand-smelt *Hypomesus olidus*.

The Eulachon, however, differs from all other varieties of the smelt family by having its entire body permeated with a peculiar fat, which, on being extracted, is of the consistence and color of soft lard, and is used largely by the natives as an article of food.

By a rectifying and deodorizing process, Messrs. Langley & Co., chemists, of Victoria, British Columbia, have succeeded in preparing an oil which appears to possess the remedial qualities of cod-liver oil in a remarkable degree, and is more agreeable to both palate and stomach. The quantity of this fatty substance is so considerable that when the fish is dried it can be set on fire like a torch and will consume its whole length like a candle, from which fact its common name of "Candle-fish" is derived. This adipose matter when first extracted, even when fresh caught, has a strong, disagreeable odor and a peculiar taste which is very unpalatable to most white persons. The fresh fish, however, has no unpleasant smell about it. It has somewhat of the same cucumber odor as the smelt, or rather an odor which resembles that of the bruised leaves of the wild syringa, *Philadelphus* L., which is a somewhat common shrub on the shores of Puget Sound and other portions of the northwest coast. When fried, like the smelt it is a most delicious pan-fish, or even when simply boiled, as the natives usually cook it, or toasted on a stick before the fire, it is most excellent and nutritious food.

The Eulachon are found in limited numbers at certain seasons in the Columbia River, Shoal-water Bay, Gray's Harbor, and at the mouth of the various small streams of the coast, and also in the waters of Puget Sound, where they are taken in seines and nets with smelt and other varieties of small fish, but they are thin and poor, and not to be compared to the same varieties further north. Even those taken in Fraser's River, near the boundary line between Washington Territory and British Columbia, are superior to those taken further south, and are sold in the Victoria market, where their excellence is highly prized. The few secured on Puget Sound are sold by the fishermen as smelts. The best

kinds are caught further north, and great quantities are salted by the Hudson's Bay Company, at their trading post at Fort Simpson, British Columbia, and either sold in the Victoria market or shipped direct to London in tierces, barrels, and kits.

As an article of food and for the grease or fat contained in them, the Eulachon are highly prized by the Indians of Northern British Columbia and Southern Alaska, where they abound; particularly at the Nass River, British Columbia, where they are annually taken in enormous quantities, and where they seem to attain their very finest condition.

The Nass River flows into Portland Inlet near the fifty-fifth parallel of north latitude, near the southern boundary of Alaska, and 30 miles north-northeast of Fort Simpson, British Columbia. At its mouth it widens out into a bay called Nass Bay or Strait, in which are various shoals favorable for the Eulachon spawning grounds.

There are other rivers and streams in British Columbia and Alaska at the mouths of which Eulachon are taken, but as the Nass River fishery exceeds them all, and is, in fact, the principal place where the business is carried on by both whites and Indians, a description of that fishery will suffice.

The principal run of the fish reaches Nass River in the latter part of March, generally from the 16th to the 22d, varying in exceptional years from the 28th to April 4. When the season approaches the Indians assemble in great numbers; not only the Nishka, or natives of the Nass country, but from hundreds of miles distant, some in canoes and some overland. In former years quarrels and fights among the different tribes were common, but of late years the influences of the missions at Metlakatla, Kincoaleth, and Fort Simpson have produced a favorable change, not only in inducing them to be more peaceful, but to lay aside their old heathen superstitions, one of which was that all the fish eaten for the first four or five days after they commence to arrive must be either fried or toasted; no one was allowed to boil any, as they believed that if any were boiled the fish would immediately leave the river; they were also strictly forbidden to drink water after a meal of fish, lest there should be rain which would hinder the drying. These ceremonies are now abandoned in a great measure, and but seldom practiced at the present time.

The Eulachon only travel up the Nass River as far as the flood tides reach, which is from 15 to 20 miles from its month. For about 7 miles from Nass Strait the river is unsuited for fishing operations. From thence to the Nass Village, at the head of tide-water, is a succession of sand-bars, and these form the spawning beds of the fish. Every available spot along the banks of the river is occupied by the Indians during the fishing season, who erect temporary wigwams for themselves.

As the fishing season approaches the arrival of the fish is anxiously watched by the natives, as it is a season of the year in which they are generally out of food.

The fish usually swim in deep water till they reach the mouth of the river, and during their passage up the strait are followed by innumerable enemies. Porpoises, seals, dog-fish, ground-sharks, and halibut harass them in the strait, and if they rise to the surface they are attacked by clouds of gulls, ducks, and other sea-fowl.

The bishop of British Columbia, who visited the Nass River in 1863, writes concerning the fisheries:

“Such a scene of life—man life, bird life, fish life—I had never before conceived. Over the fish was an immense cloud of innumerable gulls; so many and so thick were they as they hovered about looking for the fish that the sight resembled a heavy fall of snow. The fish are caught in vast quantities. I saw hundreds of tons collected together, and the nets hauled in bushels at a time.”

When the fish reach the mouth of the river they generally rise to the surface of the water, and are caught by the natives with a pole about 18 feet long, slightly flattened into an oar-shape at the lower end. Into one edge of this flattened blade are stuck a row of wooden pins or pieces of wire sharpened. This implement is thrust down and with both hands drawn rapidly through the water, and the fish are impaled on the pins and are shaken off into the canoe in the same manner as the Indians about Puget Sound take herrings. The number of Eulachon caught in this way form a good estimate of the probable run of the fish for the season, whether they will be plentiful or not.

As soon as the fish make their appearance at the sand-bars fishing operations begin in earnest. In former years a sort of large landing net, called by the natives *Bānak*, was used, but of late these have been discarded for purse-nets. About an hour after the tide has begun to ebb two strong poles are driven into the sand at the bottom of the river about 12 feet apart; to these the net is attached, the mouth being kept open by inserting two small sticks across it. It is then depressed in the water until the under rim rests on the sand; the fish are drawn into the aperture by the force of the current.

The nets are generally six or eight fathoms long. A long crooked stick is used for raising the narrow end of the net. If it contains fish it is hauled into the canoe and, by loosening a string, its contents are easily shaken out. Sometimes the net for its whole length becomes blocked with fish. The greatest care and skill are then necessary to prevent its being carried away by the current.

Another difficulty, and the cause of much damage to the nets, is the loose ice. The fish first come about the time the ice begins to break up. Of course, there are exceptions to this rule. Some years the ice remains solid until after the fish are caught, in which case holes have to be cut in the ice to put down the nets; other years, again, the ice has all disappeared before the fish arrive.

When the tide begins to flow, the nets are all taken in and all the fish caught are thrown in heaps on the ground close to the wigwams. With

a good run of fish, each net ought to catch about two tons each tide. When a sufficient supply of fish has been obtained they are not boiled down at once, but are left on the ground in heaps from six to ten days, according to the state of the weather. This is done to facilitate the boiling, as the grease separates more rapidly from the fish after a partial decomposition than when fresh. The perfume which permeates the atmosphere at this time is certainly not to be found among the extracts and essences of Lubin or Rimmel. As has been said of the odor of the skunk, "it may be healthy, but is very offensive, and a little of it goes a great way." As an Irishman once remarked to me of a similar stench, "the smell of it would kill flies," which is saying a great deal for its energetic power.

After the fish have remained exposed on the ground five or six days a portion of them are strung up for drying by having their heads interwoven with thin strips of bark; they are then washed and hung on racks to dry; they are not covered up, but are thus exposed to the atmosphere in all weathers for three or four weeks and get perfectly dried and firm, and form a chief article of food for the Indians, who either toast them over the fire or boil them. They also use them as torches. It is only necessary to set them on fire and they will continue to burn until consumed.

In extracting the grease from the fish the Indians place them in large wooden boxes and boil them by means of red-hot stones. As the grease rises to the surface it is skimmed off, and when all has risen the residue of the fish bodies is taken out and pressed to get all the still adherent portion. A ton of fish makes from 24 to 30 gallons. This is then put in wooden boxes and any convenient receptacle, and forms a lucrative article of trade among the natives, and is known in Sitka and other white settlements as *small-fish grease*.

Within a few years, and since the Indians have seen the "rockers" of the miners, they have introduced wooden boxes, with sheet-iron bottoms. These answer very well, and save time, labor, and trouble. About the same time a white man attempted the plan of extracting the grease by heating the fish in a basin floating in boiling water and then subjecting it to pressure, but the attempt proved a failure. Another plan attempted was to cold-press the fish, and for the purpose a powerful screw-press was erected, but that also proved a failure. My own impression is that the grease could be successfully extracted by steam, as is now done at the oil works at Skidgate, Queen Charlotte's Islands, in extracting oil from dog-fish livers. Still, there may be some chemical reason why the grease yields to incipient decomposition, which may suggest some preparation which can produce a similar result.

The ordinary price for the grease at Nass is twenty-five cents per gallon, but in seasons of scarcity the price advances from one dollar to one dollar and twenty-five cents per gallon, although the latter figure is seldom attained.



The Hudson's Bay Company salt a great quantity of these fish for export. They are simply put into casks or butts when first caught, and lightly salted. After remaining two or three days a brine is formed. They are washed in this brine, resalted, and packed in tight barrels, casks, or kits. For smoking, they are allowed to remain in brine a day or two, then strung on slender sticks, which are passed through the eyes, and hung in the smoke. When freshly smoked they have a bright golden appearance, much like red herrings, and are most delicious eating, but they are so excessively fat that they will not keep unless they are smoked quite dry. This is a tedious process, and turns the skin a dull dusty color.

There is a second run of Eulachon in Nass River towards the end of June, but the quality is inferior, and but little grease is made from them.

The Eulachon come suddenly in countless myriads into Nass River, and after spawning depart as suddenly. They evidently pass the remainder of the year in the deep water south of the Aleutian Islands, and make their appearance almost simultaneously in Cook's Inlet and Cross Sound, Alaska, where they are very abundant, and in Nass River. They make their appearance in Fraser's River a few weeks later, but are not as fat or as plentiful as they are farther north.

As a remedial agent, Eulachon oil is considered by some of the best authorities who have tested it as equal to cod-liver oil. Others who have tested its effects only among Indians are in doubt of its efficacy. But it should be borne in mind that the Indians of the coast, who live exclusively on a fish diet, and on the algæ and other products of the ocean, rich in iodine, bromine, and phosphates, are not so easily affected by cod-liver or Eulachon oil as white people who reside in the interior, and partake of the usual regimen of civilized life. Hence, some persons who have administered Eulachon oil to coast Indians have been surprised at the want of success, and have hastily condemned it as worthless. A diet of new milk, fresh from the cow, would undoubtedly prove as efficacious for the coast tribes as cod-liver or Eulachon oil is for white people.

The following is a copy of a report made by Theophilus Redwood, esq., F. R. S., professor of chemistry and pharmacy to the Pharmaceutical Society of London, to Messrs. Langley & Co., Victoria, British Columbia, who kindly furnished it to me for this paper. Professor Redwood writes:

"Eulachon oil, although differing in its source from cod-liver oil, is said to resemble it in its properties, and to have been substituted for it as a remedial agent. In examining the oil, therefore, it was considered important to determine in what points it resembles and where it differs from cod-liver oil. In taste and smell I cannot indicate any marked difference. Its tendency to congeal is much greater than that of cod-liver oil. At 50° Fahr. the Eulachon oil has the consistency of soft butter, and it does not become fluid until heated above 70° Fahr. The



portion separated by filtration at  $60^{\circ}$  remains bright at all temperatures above that point, and has a very slight yellowish tint, resembling that of the best pale cod-liver oil. When a few drops of sulphuric acid are added to a small quantity of the oil, placed in a porcelain capsule, it assumes a deep brown tint, without in the first instance affording the violet color which is produced under similar circumstances by cod-liver oil. If, however, the mixture thus formed be allowed to remain exposed to the air for several hours the violet color becomes developed. If an ounce or two of the Eulachon oil be boiled with about twice its volume of distilled water, and the water after being carefully separated and filtered be evaporated to dryness, a small quantity of a brown extractive matter will be left, which closely resembles the extract obtained under similar circumstances from cod-liver oil.

"The Eulachon oil readily saponifies with caustic alkali, and the soap, after being decomposed with acetate of lead, yields oleate of lead to ether, but the oleic acid resulting from the decomposition of this is not brown like that obtained from cod-liver oil.

"Eulachon oil, therefore, although in some respects resembling cod-liver oil, differs from it in some of its chemical and physical characters. The resemblance to cod-liver oil is, however, greater than that of any other oil I am acquainted with that is not extracted from a fish liver.

"THEOPH. REDWOOD."

It would have been interesting if Professor Redwood had given the exact analysis of Eulachon oil, as that of the cod liver has been fully given in various medical works. The student of medicine could have thus been able to have compared the two together, and have found what constitutes their medicinal value.

Professor Redwood says that the oleic acid resulting from the decomposition is not brown like that of the cod-liver oil. The brown color is owing to the presence of a peculiar substance obtained by an analysis of cod-liver oil by De Jough, and named by him *gaduïn*, but it has not been ascertained that gaduïn is in any way connected with the virtues of the oil.

It has been thought that the action of the liver carbonizes the oil in a manner and thus renders it more susceptible of being taken up and assimilated by the systems of persons to whom it is administered. It is not improbable that the biliary principles associated with the oil are concerned in its peculiar influences. Winckler has inferred from his researches that cod-liver oil is an organic whole, differing from all other fixed oils. Eulachon oil, although a body oil, instead of a product of the liver, seems to possess properties essentially different from all other fish-oils, and future analysis may show that the curative principle of cod-liver oil does not lay in any of the causes mentioned, but in some hitherto undeveloped principle, which is identical with that of the Eulachon. I find no mention of the Eulachon in the voyages of Portlock,

Dixon, Means, Marchard, or Vancouver, except that Means mentions them casually as *sardines*, and says the Indians are as fond of them and make quite as much account of them as they do of salmon. They are found in countless myriads in the waters of Alaska Territory, but hitherto no other use has been made of them in that Territory except as an article of food for the Indians.

If some of the canneries of Alaska would try the experiment and put them up in oil similar to sardines, I predict that a lucrative trade would result. No regular statistics of the Eulachon fishery have ever been kept either in British Columbia or Alaska, and the foregoing meager account of a very important food-fish is all that I have been able to procure.

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**DESCRIPTION OF TWO NEW SPECIES OF FISHES, ASCELICHTHYS RHODORUS AND SCYTALINA CERDALE, FROM NEAH BAY, WASHINGTON TERRITORY.**

**By DAVID S. JORDAN and CHARLES H. GILBERT.**

*Ascelichthys*, genus nova.

Family of *Cottidae*. Body rather robust, covered with naked skin. Head comparatively broad and depressed, covered with naked skin. Preopercle with a simple, strongly hooked spine. Villiform teeth on jaws, vomer, and palatines. No slit behind fourth gill. Gill membranes broadly united, free from the isthmus. *No ventral fins*. Spinous dorsal of low flexible spines. Other fins normally developed. This genus has the general appearance of *Oligocottus*, but is distinguished at once from all the known genera of the family by the absence of the ventral fins; hence the generic name from *ασκελεγις*, without leg, and *ιχθυς*, fish.

*Ascelichthys rhodorus*, sp. nov.

Body rather plump, broad, and low anteriorly, nearly cylindrical mesially, becoming compressed behind. Head comparatively broad and low, ovate, regularly narrowed forward, and rounded anteriorly. Eyes rather large, placed high, separated by a slightly concave interorbital space, narrower than the eye. Mouth rather large, nearly horizontal, the maxillary extending to opposite the posterior border of the eye. Lower jaw slightly shorter than upper. Lips rather full, the upper jaw protractile. Teeth small, in villiform bands on jaws, vomer, and palatines. The palatine bands long and narrow. Pseudobranchæ large. Gill-rakers almost obsolete. No slit behind the fourth gill. Branchiostegals six. Gill-membranes broadly united, free from the isthmus. A low, fringed dermal flap above the posterior part of each eye. No other cirri anywhere, and no trace anywhere, on body or head, of dermal prickles or scales. No nasal spines. Nostrils both with short tubes, the anterior the longer.

Suborbital stay very slender, barely reaching the preopercle. Preopercle with a rather short simple spine, strongly hooked upwards and in-

wards, concealed in the skin. A concealed downward-directed spine below this. A downward-directed spine on front of opercle below.

Skin comparatively thin and loose. Lateral line complete and continuous.

Dorsal fins connected by a membrane about half the height of the first dorsal. Dorsal spines low and weak, nearly uniform in height, the middle spines very slightly higher than the others, the highest less than the diameter of the eye, the two anterior close together. The spines all very slender. The enveloping membrane very thick.

Soft dorsal nearly twice as high as the spinous part. Anal about as high as second dorsal, its rays more robust. Pectoral fins rather broad and short, strongly procurent below, the lower rays thickened. Longest rays reaching past vent to beginning of second dorsal. No trace of ventral fins, either externally or under the skin.

Fin rays: Dorsal IX or X-18 or 19; A. 13; P. 16.

Anal papilla very small. Six pyloric caeca. Intestines short, about as long as body, with one flexure. Stomach filled with Chiton, Patella, small Crustacea, snails, and worms.

Coloration olivaceous, usually rather dark, and shaded with greenish, but sometimes with whitish saddle-like blotches, one on each side of the head, one on preopercle, one at front of dorsal, one most conspicuous opposite the junction of the two dorsals, and two smaller ones under second dorsal. On most of the specimens these markings are but faintly indicated. Belly somewhat dusky. Lips, in most specimens, edged with vermilion, especially the lower.

Spinous dorsal fin dusky, black in the middle and in front above, *with a conspicuous edging of bright crimson*. This marking is rarely faint or obsolete. Soft dorsal, anal, and caudal dusky, edged with paler. Pectoral dusky, edged with paler, and slightly barred at base, especially in the paler specimens.

This species is known to us from about 200 examples, from two to four inches in length, obtained by us at Waadda Island, in Neeah Bay, near Cape Flattery, at the entrance to the Straits of Juan de Fuca. It is found in the greatest abundance at this locality under rocks between tide-marks. It is less active in its movements than the species of *Oligocottus*, and unlike them it is often found out of the water, left in damp places under the rocks by the receding tide.

The following species have been obtained by us in this locality, which is the richest in rock pool fish of any which we have anywhere seen:

*Xiphister mucosus*,  
*Xiphister rupestris*,  
*Xiphister chirus*,  
*Ascelichthys rhodorus*,  
*Gobiesox reticulatus*,  
*Anoplarchus atropurpureus*,

*Muraenoides laetus*,  
*Apodichthys flavidus*,  
*Apodichthys fucorum*,  
*Oligocottus globiceps*,  
*Oligocottus maculosus*,  
*Scytalina cerdale*.

Table of proportional measurements.

Species: *Ascelichthys rhodorus*.

Locality .....	Necah Bay.	
	Inches and 100ths.	100ths of length to base of caudal.
Extreme length .....	3.90	.....
Length to base of middle caudal rays .....	3.40	.....
Body:		
Greatest height .....		21
Least height of tail .....		8
Head:		
Greatest length .....		30
Greatest width .....		27
Width of interorbital area .....		5
Length of snout .....		5
Diameter of orbit .....		6
Dorsal (spinous):		
Distance from snout .....		30
Length of base .....		26
Greatest height .....		4½
Dorsal (soft):		
Length of base .....		34
Height at longest ray .....		10
Anal:		
Distance from snout .....		56
Height at longest ray .....		9
Caudal:		
Length of middle rays .....		16
Pectoral:		
Length .....		24
Ventral:		
Length .....		0
Branchiostegals .....		6
Dorsal .....		IX, 18
Anal .....		13
Pectoral .....		16
Ventral .....		0
Number of caecal appendages .....		6

**Scytalina**, gen. nov.Family *Congrogadidae*, allied to *Congrogadus* Günther.

Body anguilliform, cylindrical anteriorly, compressed behind, covered with very small, imbedded cycloid scales. No lateral line. Head broad, with tumid cheeks, broader than body, resembling a serpent's head. Lower jaw slightly projecting. Each jaw with two strong canines in front, besides which is about one series of small, close-set conical teeth in the lower jaw and a broad patch in the upper. A single series of small teeth on vomer and palatines. Branchiostegals six. Gill-openings very wide, the membranes broadly connected below and free from the isthmus. Pseudobranchiæ small, present. A slit behind fourth gill. Tongue largely free anteriorly. Intestines short, without pyloric caeca. Pectoral fins very small. No ventral fins. Dorsal fin very low, without spines, *beginning near the middle of the body*. Anal similar, and beginning nearly opposite it. Tail rounded behind. Caudal fin well developed, joined to dorsal and anal. Vent near the middle of the body. No anal papilla.

Etymology: diminutive of *Scytale*, a genus of serpents, in allusion to the form of the head and neck and the fang-like canines.

The relations of this genus seem to be with *Congrogadus* Günther, from



which it differs in the presence of canines and in the short dorsal fin. This is the first species of the family thus far known from north of the equator.

*Scytalina cerdale*, sp. nov.

Body elongate, cylindrical anteriorly, compressed behind, covered with very small imbedded scales. No lateral line. A slight vertebral streak and three very obscure dusky lateral streaks simulating lateral lines.

Head broader than long, with tumid cheeks and constricted neck, much resembling the head and neck of a small snake. Form of snout subconic, the head abruptly narrowed at the eyes, below which is a slight vertical groove. Snout depressed, rounded at tip.

Interorbital space rather broad, posteriorly concave, a median wrinkle extending along the vertex to the nuchal depression. All these depressions are rather apparent than real, being due to the tumidity of the cheeks, which encroach on the other parts.

Eyes quite small, directed almost upward, nearly even with the top of the head. Lips full, the upper separated by a crease from the skin of the forehead, the lower with free margin. Skin of forehead with two or three dermal flaps on each side. In one of these the anterior nostrils and some mucous pores open. Posterior nostril near the eye, with a very small flap. Edge of lower lip sparsely fringed, below which the skin has several coarse pores with dermal flaps.

Gape of mouth rather wide, extending a little beyond the eyes. Lower jaw slightly projecting, its front with two strong, conic, divergent canines. Between these, and behind, along the sides of the jaw, is a series of smaller close-set conical teeth. Upper jaw with two smaller canines, closer together than those in the lower jaw. Edge of upper jaw with close-set conical teeth, apparently in a single row behind, widening into a broad band in front. A single series of small teeth on vomer and palatines.

Branchiostegals seven. Gill-openings very wide, the membranes broadly connected and free from the isthmus. Pseudobranchiæ small. Gill-rakers almost obsolete. Gills four, a slit behind the fourth. Opercle very short, the tumid cheeks encroaching upon it.

Pectoral fins very small, a little below the axis of the body, their length a little more than the diameter of the eye. No ventral fins. Dorsal fin very low, of soft rays only, which are short and weak, imbedded in the skin. Its insertion a little in front of first ray of anal and slightly in advance of the middle of the body. Tail apparently isocercal, rounded behind, with a well-developed caudal fin, which is rounded behind, and composed of rays longer and much slenderer than those in the dorsal and anal. No constriction between dorsal and anal and caudal, the rays of the former fins being joined to the latter at their full height. Anal precisely like dorsal and nearly coterminous with it. Vent immediately in front of anal. No anal papilla.



Intestinal canal a simple short tube, without cæcal appendages. Air bladder obsolete, or reduced to a filmy membrane. Nothing found in the stomach.

Flesh color, with much mottling of purplish above, in fine, close pattern, so that the light areas appear in the form of pale spots. Lower parts finely speckled like the back, except the belly, which is nearly plain. Fins similarly colored.

Anal nearly plain. Caudal reddish edged.

Fin rays not readily counted. Dorsal about 41. Anal 36.

Two specimens of this species were obtained by us at Waadda Island; a third was seen, but it escaped us. It inhabits piles of shingle and small boulders near the mark of lowest tides, and when disturbed makes its way downward with great celerity through small crevices into the water. The specimens taken are each about  $5\frac{1}{2}$  inches in length.

*Table of proportional measurements.*

Species: *Scytalina cerdale*.

Collector's number of specimen Locality	No. 226. Neeah Bay.	
	Inches and 100ths.	100ths of length to base of caudal.
Extreme length	5.80	
Length to base of middle caudal rays	5.50	
Body:		
Greatest height		7
Head:		
Greatest length		13
Distance from snout to nape		9
Greatest depth		$7\frac{1}{2}$
Greatest width		6
Width of interorbital area		$2\frac{1}{2}$
Length of snout		$2\frac{1}{2}$
Length of cheek		7
Length of mandible		5
Diameter of orbit		$1\frac{1}{3}$
Dorsal:		
Distance from snout		45
Length of base		55
Greatest height		2
Anal:		
Distance from snout		46
Length of base		54
Vent:		
Distance from snout		42
Caudal:		
Length of middle rays		$5\frac{1}{3}$
Pectoral:		
Length		$1\frac{1}{3}$
Ventral:		
Length		0
Branchiostegals		7
Dorsal		ca 41
Anal		36
Number of cæcal appendages		0

## ON CAMARAPHYSEMA, A NEW TYPE OF SPONGE.

By JOHN A. HYDER.

A singular organism, which I will name *Camaraphysema obscura*, was first observed by me on living oysters from Chesapeake Bay, attached to hydroids growing on those mollusks. The single specimen which I obtained measured less than half an inch in length, and consisted of a larger and smaller individual (person), united basally to a common attachment, constituting a corm or colony. The color was yellowish, or dirty white; the form of the branches was cylindrical, club-shaped, covered by a tough skin (ectoderm?), which was perforated at intervals, giving rise to tubular, funnel-shaped, oscular openings of exceedingly variable form, according to their condition of expansion. The margin of the funnels was entire and exceedingly thin and tough; this portion was capable of being thrown into longitudinal folds and withdrawn or inverted inwards into the basal portion. These funnels communicated at their bases with chambers, lined, apparently, with a single layer of cells (endoderm?). No mesodermal structures were observed, unless the single egg which I noticed in the first cleavage stage, from its apparent position, is to be regarded as a product of this layer.

The chambers were lined throughout the entire organism with a similar layer of nucleated, columnar cells, as was shown by a series of cross-sections, but no evidence of a collar or flagellum could certainly be detected as forming the inner extremities of the cells. The embryos observed were nearly all in the blastula or morula stage of development, and appeared to lie superimposed upon the living cellular pavement of the chambers, except the one observed in the stage of first cleavage, which seemed to lie in contact with the membranous wall of its chamber. The whole organism was composed of very irregular chambers, separated from each other by an apparently almost structureless membrane, probably of an ectodermal nature. The only evidence of structure here was the presence of faint, delicate striations when the edges of the walls were transversely cut across and viewed with high powers. No spicules were to be found in any situations; no fibers, as in the genus *Spongia*; but the whole supporting structure consisted, as stated before, of the structureless ectodermal membrane, which was perforated and produced at intervals into the funnel-shaped oscular organs.

The chambers in the center or axis of the cylindrical body of the organism could not certainly be made out to communicate with those next to the membranous, funnel-bearing body-wall; but these axial chambers appeared to differ in no way from the outer ones in structure. They were lined like the external chambers with cells, and, like them, contained ova in different stages of development, together with brown material, apparently dirt or remains of ingested food, which would appear to show that there was some sort of communication with the oscular funnels. Only once did I find what I believed to be an intercameral

demi-canal, paved in the same way with cells as the chambers themselves.

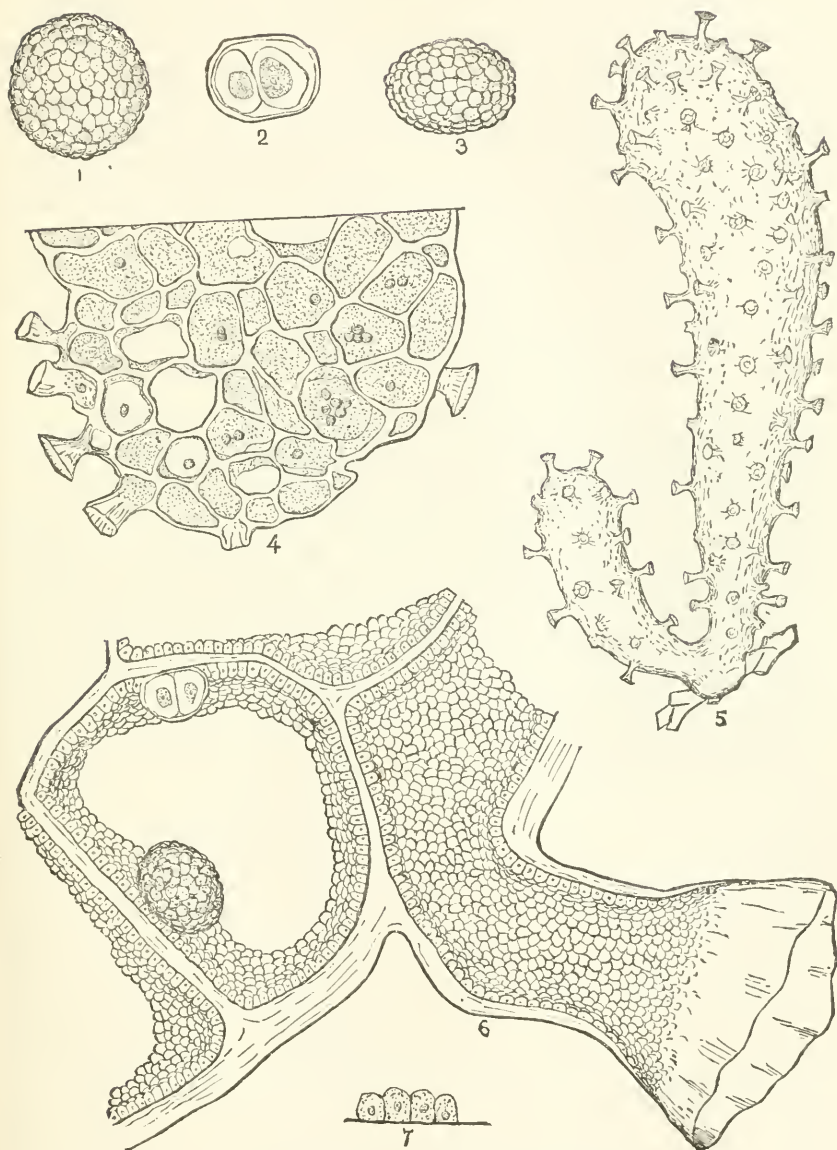
Not seeing the sponge in an absolutely fresh condition, I could not observe the action of the funnels in life; but once while the whole sponge was still in a comparatively fresh condition, and under observation in a zoophyte trough, I saw one of the inverted funnels suddenly everted and expanded to apparently its fullest extent. I was also unable to detect the slightest evidence of any other kinds of openings besides the funnels into the organism, and these were of about the same size throughout. This fact, together with others which I have stated, removes all doubt as to the sponge nature of the organism.

There is no form known to me in literature which corresponds to this in structure. *Halysarca* does not have a tough membranous ectoderm, while the *Physemaria* have an ecto-skeleton, composed of the shells of *Foraminifera*. But as the existence of the *Physemaria* has been apparently doubted by some zoologists, the position of *Camaraphysema* becomes an interesting question. At any rate it may be safely placed close to the fleshy sponges, and may possibly constitute a distinct family.

The account now offered, while it is not as complete as might be desired, rests upon sufficient evidence to make it desirable that the fullest possible description of the organism should be put upon record for the benefit of those who may have the opportunity of extending or confirming my interpretation of its anatomical and embryological features. While I could hardly convince myself at first that I did not have before me some one of those curious compound Ascidians of the suborder *Synascidice*, the absence, however, of a common cloacal cavity and any indications of a branchial apparatus or a digestive canal satisfied me that I was not dealing with a tunicate, but that I should have to look among the very lowest of the sponges for its nearest affines.

I have stated that no collar or flagellum could be detected as forming the inner extremities of the cells lining the cavities. This fact does not, however, render it improbable that such structures exist in the living animal, as it must be borne in mind that both Bowerbank and Carter have called attention to the circumstance that the flagellate cells of sponges withdraw their collars and flagella after death. The extreme irritability of sponges is notorious, and to one who sees it for the first time would be considered remarkable, and it is not unlikely that *Camaraphysema* partakes of this characteristic, known to be well-nigh common to all the members of the group.

The exact locality from whence this species was derived could not be ascertained; all that the writer could learn was that the lot of oysters from whence he had obtained his specimen had certainly been brought from the waters of the Chesapeake. It is to be hoped that more specimens will be brought to light, as the writer in investigating his unique specimen was obliged to sacrifice it in order to make his study as complete as possible by slicing it up into sections.



CAMARAPHYSEMA OBSCURA, Ryder.

## EXPLANATION OF THE FIGURE ON PRECEDING PAGE.

- FIG. 1.—Embryo in the mulberry stage of development, enlarged 250 times.
- FIG. 2.—Embryo in the condition of the first cleavage, showing the nuclei and nucleoli of its cells distinctly and an egg membrane, 250 diameters.
- FIG. 3.—Embryo in mulberry stage of more frequent ovoid form, 250 diameters.
- FIG. 4.—Part of a cross-section of the larger branch of the animal, showing the chambered character of the organism, the membranous septa, the oscular funnels in various conditions of extension, and the eggs and embryos in place; 25 diameters.
- FIG. 5.—The whole animal of *Camarophyscma obscura*, enlarged 7 times.
- FIG. 6.—A small portion of a cross-section similar to Fig. 4, showing the single layer of cells which pave the walls of the chambers, with the embryos in position in one of the latter. The striæ on the cut edges of the walls of the chambers and the peculiar conformation of the oscular funnels are indicated. Enlarged 200 times.
- FIG. 7.—Four of the pavement cells lining the chambers, magnified 900 times, showing their nuclei distinctly.



**DESCRIPTION OF TWO NEW SPECIES OF SCOPELOID FISHES,  
SUDIS RINGENS AND MYCTOPHUM CRENULARE, FROM SANTA  
BARBARA CHANNEL, CALIFORNIA.**

**By DAVID S. JORDAN and CHARLES H. GILBERT.**

*Sudis ringens*, sp. nov.

The type of this species is in very poor condition, having been taken from the stomach of a *Merluccius*, itself found in the stomach of an Albicore (*Oreynus alalunga* = *Oreynus pacificus* Cooper). The process of digestion has destroyed the adipose fin, the ventral fins, and the skin of one side, and the back part of the head is considerably mutilated. Fortunately, the anterior part of the head, with the jaws and teeth, is not at all injured, and the dorsal and anal fins are well preserved. There is, therefore, no doubt concerning the classification of the fish, and as it is the only one of its type yet found in the Pacific, and evidently different from *S. hyalina*, a description of it seems desirable, even though our material is not complete.

Body very slender and elongate, compressed, the depth forming about one-sixteenth of the length. Head rather slender, anteriorly pointed and moderately depressed, so much injured behind the eyes that its exact form posteriorly cannot be ascertained. Mouth large, horizontal, the gape extending more than half the length of the head. Margin of the upper jaw formed entirely by the very slender, nearly straight premaxillaries, which are closely appressed to the long and slender maxillaries. Maxillaries extending to below the eye, nearly as far as the mandibular joint. Tip of upper jaw emarginate. Tip of lower jaw rather broad, turned up, and fitting in the notch of the upper jaw. Premaxillaries armed with a series of small, sharp, subequal, close-set teeth, which are hooked backward. A long slender canine in front on each side.

Lower jaw with about ten sharp, slender teeth on each side, these teeth very unequal, some of them short, three or four very long and canine-like. Near the front is one fang-like tooth on each side, then a considerable interspace, behind which the others are arranged partly in two rows. Most of these teeth, especially the inner and larger ones, and the anterior canines, are freely depressible. A long series of teeth on the palatines, one or two of the anterior teeth on each side and one or two others long, slender, and fang-like. Tongue free anteriorly, roughish, but apparently without teeth.

Opercular bones very thin and membranaceous. Branchiostegals about seven. Gill-membranes not connected. Gill-rakers short, sharp, spine-like.

Scales nearly all lost. The few preserved are very large, cycloid, their diameter nearly a fourth of the depth of the body.

Dorsal fin inserted somewhat behind the middle of the body, at a distance of nearly 4 times its base in front of the anal, its height a little greater than the length of its base. It is composed of 11 (1, 10) rays. Adipose dorsal not preserved.

Anal fin anteriorly nearly as high as the dorsal, its posterior rays low. The number of rays apparently I, 25, possibly I, 24 or I, 26. Ventral fins totally obliterated. Pectoral fins placed low, rather short, about as long as the maxillary. Caudal fin short, narrow, apparently forked.

The coloration is apparently light olive, the sides silvery, with dark punctulations. Fins plain. Peritoneum silvery, underlaid by black pigment.

*Table of measurements.*

Total length.....	(ca) 6.60 inches
Length to base of caudal .....	6.25 inches = 100
Body :	
Greatest depth .....	6
Least depth .....	2
Length of caudal peduncle .....	6
Head :	
Length .....	(ca) 16½
Length of maxillary .....	9
Length of mandible .....	11½
Length of snout .....	8
Dorsal :	
Distance from snout .....	57
Length of base .....	5½
Greatest height .....	(ca) 7
Anal :	
Distance from snout .....	80
Length of base .....	(ca) 14
Greatest height .....	(ca) 5
Pectoral length .....	8
Dorsal rays .....	1, 19
Anal rays .....	1, 25

This species differs from *Sudis hyalina* as described by Dr. Günther (Cat. Fishes Brit. Mus., v, 420) chiefly in the dentition, canine teeth being present on the premaxillaries and palatines, as well as on the mandible. The head is also shorter and the mouth apparently larger in proportion.

**Myctophum crenulare**, sp. nov.

Form much compressed, deepest in front of the base of the pectorals, bluntly convex anteriorly, tapering behind. Ventral region much more arched than dorsal. Caudal peduncle long and very slender. Head short and high, abruptly rounded in profile, the snout very blunt. Jaws equal, the snout not projecting beyond the mouth. Maxillary very slender, scarcely widened to its tip, and not dilated, its extremity reaching beyond the eye to the margin of the preopercle.

Premaxillaries anteriorly on a level of the pupil. Teeth very small, present on all the dentigerous bones. Rami of the mandible nearly parallel, coming together in a sharp keel below.

Orbital margin above and in front with a thin membranaceous rim, that in front distinct and formed by the upturned edge of the preorbital. Nasal bones membranaceous, their edges upturned, forming a horizontal

groove. A groove between the frontal bones. Orbital margins separated by a groove from the preopercle. Margin of preopercle very oblique. All the membrane bones extremely thin, membranaceous. Eye large,  $3\frac{1}{8}$  in head. Gill-rakers long and slender. Head  $3\frac{3}{4}$  in length to base of caudal; depth  $4\frac{1}{2}$ .

Head and body completely covered with thin membranaceous scales, those on the middle of the sides not elevated and not noticeably larger than the others. Free edges of all the scales crenulate, some of them, especially on the back, with the crenations acute, but without spines, the scales not being really ctenoid or spinous. About 45 scales in a longitudinal series.

A phosphorescent spot on each mandible near the symphysis, 33 pairs of spots along the belly, 6 in front of ventrals, 6 between ventrals and origin of anal, and 21 between front of anal and base of caudal.

Caudal peduncle above and below with two or three backward-directed spines, which are apparently the exerted tips of vertebral processes.

Fin rays (not quite certain, the tips being frayed out): Dorsal about 12, anal about 16, the fins rather low.

Origin of dorsal nearer the snout than the base of caudal, much behind the base of the ventrals. Ventrals short, not reaching half way to vent. Pectorals reaching base of ventrals.

Color very dark steel-blue above, silvery on sides and below, with dark metallic luster. The usual phosphorescent spots present, as above described. No evident cream-colored blotch on the back of tail.

*Myetophum crenulare* is known to us at present from a single specimen, about  $1\frac{1}{2}$  inches long, taken from the stomach of an Albicore (*Oreynus alalonga*) in Santa Barbara Channel, July 11, 1880. It had evidently just been swallowed, and is in fairly good condition.

It belongs to that division of the genus "*Scopelus*" called by Dr. Günther "*Myetophum*" (Cat Fishes Brit. Mus., v, 405). As the latter name has priority over *Scopelus*, it must be retained as a generic name for some or all of these fishes.

Table of measurements.

Extreme length.....	2.20 inches
Length to base of caudal.....	1.80 inches = 100
Body:	
Greatest depth.....	23
Least depth of tail.....	4
Length of caudal peduncle.....	22
Head:	
Greatest length.....	27
Width of interorbital.....	6
Length of maxillary.....	19
Length of snout.....	3
Diameter of eye.....	8
Dorsal, distance from snout.....	51
Anal, distance from snout.....	54
Pectoral, length.....	94

## Ventral:

Length.....	12
Distance from snout.....	39
Dorsal rays.....	(ca) 12
Anal rays.....	(ca) 16
Number of scales in longitudinal series.....	45
Number of phosphorescent spots.....	33

SANTA BARBARA, CAL., July 15, 1880.

**DESCRIPTION OF TWO NEW SPECIES OF FLOUNDERS (PAROPHRYS ISCHYRUS AND HIPPOGLOSSOIDES ELASSODON.) FROM PUGET'S SOUND.**

**By DAVID S. JORDAN and CHARLES H. GILBERT.**

**Parophrys ischyrus, sp. nov.**

Body rhombic-oblong, less deep than in *Platichthys stellatus* or *Lepidopsetta bilineata*, and with the head more pointed and protruding, but less so than in *Parophrys vetulus*. Body tapering from the middle to the head and tail, the four bounding lines but little curved and quite regular. Caudal peduncle strong, compressed, and rather long. Head comparatively long, a slight angle over the eye, and the snout protruding and not obtuse. Lips full, simple. Mouth moderate, oblique, the lower jaw slightly projecting and somewhat more developed on the blind side,

Teeth about  $\frac{5 + 25}{10 + 22}$  in number.

Teeth in one series, rather close set, some on both sides of the jaw, but more numerous on the blind side, somewhat irregular in length, some of them movable. In form the teeth are somewhat compressed and incisor-like and bluntish, but not as notably so as in some related species. No teeth on vomer and palatines.

Maxillary reaching past the front of the orbit, nearly to the pupil. Anterior nostril with a flap. Posterior nostril almost simple. Tongue free. Eyes rather large, the upper directed upward, the lower slightly in advance of the other. An area covered with smooth skin in and behind orbit of upper eye.

Interorbital space rather broad, somewhat elevated mesially, continuous, with a slightly marked ridge above the opercle and forking forwards, the lower branch ending in a blunt prominence.

Snout behind nostrils, interocular ridge, and posterior part of head covered with scales like those on the body, but smaller and rougher. Preorbital very narrow, naked. Skin of head continuous over the edge of the preopercle. Gill openings above not continued forward. Gill-rakers short, slender, and weak, about 12 below the angle of the arch. Branchiostegals seven. Lower pharyngeal bones separate, each with two rows of coarse, blunt teeth.

Scales moderate in size, thick and firm, adherent, not closely imbricated, anteriorly separated. Those on the tail oblong and a little im-



bedded, those on the head and anterior regions rather regularly arranged, but not close together.

Scales strongly ctenoid everywhere, each with a semicircle of six to ten upward-directed spinules on its posterior edge. Those on the head and body are similar, the former being a little smaller and rougher, especially behind the eyes, where they are somewhat stellate.

Left or blind side of the body uniformly scaled like the eyed side, the scales similar and *almost as strongly ctenoid*. Preopercle nearly smooth. Rest of head with small rough scales, similar to those on the right side, but farther apart.

Caudal, middle part of dorsal and anal, and bases of pectorals and ventrals with small rough scales in series, running up the rays on the right side. On the blind side the base of the caudal with small rough scales. Other fins naked.

Lateral line conspicuous, its scales less rough than the others; a very slight curve anteriorly, otherwise straight. A distinct short accessory lateral line on both sides, extending to about the tenth dorsal ray. A series of pores around lower eye behind. No enlarged scales along lateral line or at the bases of the fins.

Lateral line with about 88 pores; about 80 scales in a longitudinal series above the lateral line.

Dorsal fin beginning over the pupil, its first rays turned slightly toward the blind side, low in front, the rays regularly increasing to behind the middle of the body, then similarly diminishing. Anal fin similarly formed, preceded by an antrorse spine. Highest rays of dorsal and anal about equal and nearly half the length of the head.

Caudal fin large, somewhat double-truncate, the middle rays produced. Pectoral a little more than half the length of the head, that on blind side shorter. Ventrals reaching to anal. Rays of dorsal and anal all simple.

Dorsal rays, 79-76; anal, 52-57; ventrals, 6. Eyes and color on the right side.

Color above light olive-brown, vaguely clouded with light and dark. Fins reddish-brown; a few roundish dusky blotches on dorsal and anal, resembling in position the black vertical bars found in *Platichthys stellatus*. Pectoral and caudal tipped with dusky. Blind side white, either immaculate or else with small round rusty spots. Left side of head sometimes rusty tinged.

This species is known to us from four examples obtained with a seine in the harbor of Seattle, Washington Territory. We place it temporarily in the genus *Parophrys*, inasmuch as it has the technical characters at present assigned to that genus, *i. e.*, the small mouth with blunt uniserial teeth, and the straight lateral line with its accessory dorsal branch. The character of cycloid scales assigned to *Parophrys* needs modification, as in *Parophrys vetulus* most of the scales on the cheeks and tail are slightly ctenoid.



It is, however, evident that there is no special affinity existing between the present species and *Parophrys vetulus*, and no very close relation between either and *Lepidopsetta isolepis* Lockington, which, by its technical characters, would be also a *Parophrys*. The nearest natural ally of *Parophrys ischyrys* is perhaps *Lepidopsetta bilineata*, and the present arrangement is to be accepted only until the relations of these forms can be more fully investigated.

**Hippoglossoides elassodon**, sp. nov.

Body oblong-elliptical, strongly compressed, the dorsal and ventral outlines regularly and pretty strongly arched. Caudal peduncle moderate, about as long as deep and growing wider behind.

Head rather large, bluntish, its upper profile continuous with the outline of the back. Depression over the eye slight. Mouth comparatively large, very oblique, the upper jaw somewhat concave in outline, the lower correspondingly convex, the gape considerably wider on the blind side than on the right side. Lower jaw rather strongly protruding, with a considerable symphyseal knob. Maxillary rather narrow, reaching to opposite the middle of the pupil or beyond, the maxillary on the blind side much longer than the other. Premaxillary anteriorly on the level of the interocular space.

Upper jaw with a *single series* of small conical teeth, which are not very sharp. These teeth are somewhat larger in front than on the sides, and also more widely set. Everywhere they are quite small, much smaller than in *Hippoglossoides jordani*, and not larger than in *H. exilis*. Lower jaw with a single series of rather close-set teeth similar to those in the upper jaw, or slightly larger; those on the sides smaller than the anterior teeth. Number of teeth about  $\frac{35 + 45}{25 + 35}$ .

Eyes large, nearly even in front, the upper eye directed somewhat upward, but not reaching the dorsal line. Interorbital space a narrow sharp ridge, with about two rows of minute scales; 10 to 15 rows of scales in an oblique series on the cheeks. A series of mucous pores around lower eye behind. Preorbital narrow. Anterior nostril with a rather long flap, posterior with a slight tube.

Gill-rakers long, slender, and straight, 15 to 17 below the angle of the arch, their inner margins feebly dentate. Pyloric cæca 4.

Scales small, firm, less readily deciduous even than in *H. jordani*, rough to the touch, with the spinules short and firm. Scales on head similar, but more imbedded, those on the tail larger and rougher.

Scales on blind side small, mostly smooth, except on the caudal peduncle, where they are larger and rough etenoid, like the scales on the right side. The scales along the base of the dorsal and anal and those near the lateral line more or less etenoid. Scales along left side of head small, non-imbricate, those on the preopercle and posterior part of the cheeks becoming obsolete. The amount of roughness on the scales below is subject to considerable variation.

Lateral line very prominent, as in *H. exilis*, the tubes coarse, their number (88 to 92) less than that of the transverse series of scales.

Scales: 41 to 50; 110 to 120; 35 to 44.

Lateral line slightly rising anteriorly, but without arch. No accessory lateral line. Rays of all the fins on the eyed side (except the posterior part of dorsal and anal) and of the caudal on the left side covered high up with series of narrow ctenoid scales.

Fins well developed, of firm texture, the tips of the rays protruding.

Dorsal fin beginning immediately in front of the pupil, its anterior rays low, the others regularly increasing backwards to a point much behind the middle of the fin, then becoming rapidly shorter, the highest rays nearly half the length of the head and more than the length of the caudal peduncle.

Anal fin preceded by a spine, its highest rays opposite to or in front of those of the dorsal and equal to them, the others rapidly shortened. Caudal long, double-truncate or convex, the middle rays considerably produced, as in *H. exilis*, more than in *H. jordani*.

Pectoral fin half the length of the head, that on blind side shorter. Ventrals moderate, reaching past front of anal, their inner rays shortened.

Dorsal rays, 77 to 84; anal rays, 59 to 63; ventrals, 6.

Color light olivaceous brown, nearly uniform on the body. Fins grayish, obscurely and irregularly blotched with dusky. Blind side plain.

This species differs from *Hippoglossoides jordani* and *H. exilis*, the two species thus far known from the Pacific coast of the United States, in the presence of but a single row of teeth in the upper jaw. From *H. jordani* it further differs in the much smaller teeth, fewer fin rays, and more convex caudal. From *H. exilis* the small scales and firmer texture at once distinguish it. Its nearest relative is probably the Atlantic species, *Hippoglossoides platessoides*, which has a larger number of rays in the vertical fins.

*Hippoglossoides classodon* is known to us by about 20 examples of different sizes, all obtained with hook and line from the wharves at Seattle and Tacoma, in Washington Territory.

Table of proportionate measurements.

Species .....	Parophrys ischyrys.				Hippoglossoides classodon.			
Locality .....	Seattle.		Seattle.		Seattle.		Tacoma.	
	Inches and 100ths.	100ths of length.	Inches and 100ths.	100ths of length.	Inches and 100ths.	100ths of length.	Inches and 100ths.	100ths of length.
Extreme length.....	17. 05	.....	14. 20	.....	9. 75	.....	12. 90	.....
Length to end of middle caudal rays.	14. 30	.....	11. 50	.....	7. 80	.....	10. 50	.....
Body:								
Greatest height.....		43½		45½		41		46
Least height of tail.....		9½		9½		9½		11
Length of caudal peduncle.....		10½		9½		10½		9
Head:								
Greatest length.....		26½		31		30		29
Width of interorbital area.....		1½		1¾		1		1
Length of longest gill-raker.....						3½		3
Length of maxillary (from tip of snout).....						13		12
Length of maxillary (from tip of snout, blind side).....								14
Length of mandible.....						16½		15
Distance from snout to orbit.....		4½		6		5		6½
Diameter of orbit.....		5		5½		8		7
Dorsal:								
Distance from snout.....						8		6½
Height at longest ray.....		13		14½		14		14
Anal:								
Distance from snout.....						40		36½
Height at longest ray.....		13½		14½		15		13½
Caudal:								
Length of middle rays.....		19		22½		23½		22
Length of external rays.....						22		19
Pectoral, length.....		15		16		17		14
Ventral, length.....		7		9		11		11
Dorsal rays.....	76		70		77		77	84
Anal rays.....	57		52		59		59	61
Ventral rays.....	6		6		6		6	6
Number of tubes in lateral line.....	88		88			926		90
Number of transverse rows.....						120		110
Number of caecal appendages.....						4		

ASTORIA, OREG., June 16, 1880.

## ON THE GENITALIA OF MALE EELS AND THEIR SEXUAL CHARACTERS.\*

By S. TH. CATTIE, Arnheim, Holland.

As is well known, Darwin† has called attention to the experience of Günther that the females of fishes are in almost all cases larger than the males. This was perhaps the reason that Syrski, in 1874,‡ in investigating the reproductive organs of eels, directed his attention more especially to the smaller individuals, where he was fortunate in finding what is called by many the organs of Syrski, and also considered to be the male genital apparatus. Afterwards, in a variety which is known

\* Ueber die Genitalien der männlichen Aale und ihre Sexualunterschiede, von S. Th. Cattie, Phil. nat. Cand., Docent an der Realschule zu Arnheim (Holland). Extracted from the Zoologischer Anzeiger, 7th June, 1880, pp. 275-279. Translated by J. A. Ryder.

† Ch. Darwin, Descent of Man, translated into German by Carns, part ii, p. 5 et seq.

‡ Abhandl. d. kais. Akad. d. Wissensch., Wien, April Heft, 1874.

in France under the name of *Anguille pimperneau*, Dareste\* found the same organ. It appears that only in one case (*Anguilla bostoniensis*) have living spermatozoa been found in a male eel, as we learn from a communication to the *Zoologischer Anzeiger*, vol. ii, No. 18, p. 15, by A. S. Packard. The male in this case was about 430<sup>mm</sup> long (17 inches). That the finding of such specimens is so very rare should not astonish us, since the young eels migrate to the deep sea, where the reproductive organs complete their development very rapidly (6 to 8 weeks), when spawning takes place; the old eels, the females as well as the males, dying after the reproductive act is consummated. Though on this account the spermatozoa, and in most cases their testicular mother cells, are wanting, the investigation of the histological structure of the organ of Syrski may still bring us somewhat nearer to the truth.

If one examines partially grown eels measuring 200–500<sup>mm</sup> in length one will find a moderate broad band in the abdominal cavity of some of them, attached at its inner margin by a narrow duplicature of the peritoneum to the air-bladder, the other margin, however, hanging free in the cavity of the abdomen. This band extends from the liver to behind the anal opening, and is covered by thousands of fat cells. A lobular organ, consisting also of fat cells, overlies the hinder portion of the alimentary canal and ovary. I found the eggs to average 0.75<sup>mm</sup> in diameter from specimens 20–50<sup>cm</sup> in length. Treated with acetic acid and ammoniacal carmine solution, a large nucleus and nucleolus became visible. In other examples, although the fat lobules were present, the broad band was absent. But in exactly the same position and along the dorsal aspect of the abdominal cavity a quite thin band or strip of tissue of glass-like transparency is attached, and likewise by a fold of connective tissue (peritoneum), to the air-bladder, and extends from the liver to behind the anal opening. This band or strip of tissue is crenated along its free margin, the lobes of which measure 0.75<sup>mm</sup> in length and 0.5<sup>mm</sup> in depth, their convex portion depending into the abdominal cavity. In this Syrskian or lobed organ one finds, along the margin where it is attached, a fine canal, the efferent seminal duct, which, upon being tinged with carmine, becomes quite distinct, and which may also be demonstrated by means of injections. The histological structure of the foregoing lobulated organ was investigated by Freud.† He found an areolar structure with connective tissue corpuscles, similar to the histological structure of the immature testes of fishes. My preparations had a similar appearance as long as the smaller examples were the subjects of investigation. In the largest specimens of eels with lobulated organs investigated by me (445<sup>mm</sup> long) I found cylindrical strings, which passed from the bases to the tips of the lobes, and were filled with cells. After repeated trials with the most different reagents, I did not succeed in clearly distinguishing a nucleus in these cells. My observations

\* Compt. Rendus, 1875. t. lxxxii p. 159.

† Sitzungsber. d. kais. Akad. d. Wissensch., Wien, 1877, März Heft,



were made with a Zeiss immersion, objective K, oculars 2 and 3. According to Jacoby,\* Von Seibold saw similar strings of cells in an eel, in which the lobes were very strongly developed. These strings of cells presented to the eye the most undoubted similarity to the testicular mother cells of spermatozoa. I also believe that the strings of cells observed by me must be regarded as such. In no case did I observe any spermatozoa.

Previous to my investigations into the histology of the testicular lobes of the eel, I occupied myself with the question whether there were not some other external characters distinguishing the sexes besides the already mentioned difference in size and length. Jacoby remarks as follows upon this point:

"1. A distinctly broader snout in the female as compared with the slender, either elongated or short, and pointed snout of specimens with the lobulated organs.

"2. A lighter coloration of the female, usually quite green on the back and yellowish or yellow on the belly, whilst the other sex is much darker green in color, often an intense black on the back, with always a more marked metallic luster on the sides, and usually whitish on the belly.

"3. A further and important external character is an appreciable difference in the height of the dorsal fin (a point confirmed by me). All the females have a distinctly higher and wider dorsal than males of the same size.

"4. And, finally, we may note, although not a constantly appreciable character, the greater diameter of the eye of the male. Eels with strikingly small eyes seem almost always to be females. Eels which have a Syrskian organ usually have relatively large eyes, though large-eyed females are equally common."

Jacoby then gives some measurements, the averages of a great number of eels measured by him, from which the actual value of his characters becomes apparent. I believe, nevertheless, that he attaches too much importance to some of his characters, and some others, not less important, he has not noticed at all.

Out of a great number of eels measured by me I select the following, in which the measurements given in the parallel rows are taken from pairs the lengths of which are, as nearly as possible, the same:

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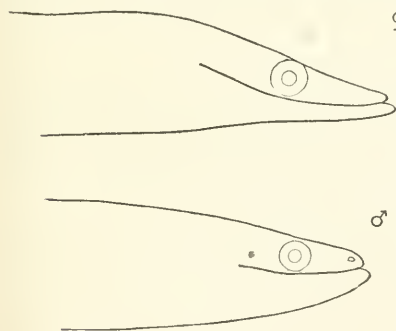
\* Dr. L. Jacoby, *Der Fischfang in der Lagune von Commachio*.



	Length of the body.	Width of the snout between the nasal tubes.	Width of the snout between the centers of the eyes.	Length of the mouth from the middle of the eye to the tip of the snout.	Diameter of the eyes.	Length of the head to the gill-opening, measured along the lower jaw.	Height of the dorsal fin.
	mm.	mm.	mm.	mm.	mm.	mm.	mm.
I	270	— 4	8	8	4	35	6
	305	4.5	8.5	9	3.5	35	— 7
II	325	— 4	8	9	4.5	37	7
	324	— 5	9	10	5	39	8
III	327.5	— 4	9	9	4	40	6.5
	327.5	5	10	— 10	5	40	7.5
IV	345	— 4	8	10	5	41	6
	344	4.5	9	+ 10	4	43	7
V	355	4	+ 9	9	5	41	— 7
	352	5	10	10	+ 5	42	7.5
VI	359	— 4.5	+ 9	— 9.5	5	+ 41	— 7
	358	5	10	10	5	42	+ 8
VII	378	4.5	9.5	10	5	43	7
	375	6	11	12	5	45	+ 8
VIII	389	4.5	9.5	10	5	44	7
	380	— 5.5	10	11.5	4.5	47.5	+ 8

— 4 indicates somewhat less than 4; + 4 somewhat more than 4.

From this table the conclusion is reached that all the females have the dorsal fin higher than those specimens of the same length presumed to be males, and that with age this difference becomes still more marked.



The larged-eyed character of eels with the lobulated organs has appeared to me to be too uncertain a feature, so much so that, according to the foregoing table of measurements, the same feature might be assumed as characteristic of the females. On the other hand, I attach great importance to the broader snout of the female in contrast to

the slender and pointed snout of the male. But the snout of the female is not only broader, but also more depressed, and has the eyes more prominent, a feature to which I would call special attention, and one which I do not find in the male. In contrast, the snout of the male eel is more convex, as will be seen by comparing the accompanying outline sketches.

If one will only notice the width or slenderness of the dorsal, and more especially the broad, depressed snout of the female, with the prominent eyes, as compared with the slender, convex snout of the male, it will require little trouble to pick out the specimens from these data conjectured to be males.

On an average amongst twenty eels, measuring 300–500<sup>mm</sup> in length, furnished me by different fishermen, I found 5 eels with lobulated organs or 25 per cent. If, however, I paid attention to the two most impor-

tant characters, namely, the relative proportions of the dorsal and snout, by their help picking out those specimens which appeared to be males, I actually found 80 to 90 per cent. of the individuals so selected to be males with the Syrskian organ.

I found it impossible to discover distinctive sexual differences of coloration; all the males and females investigated by me were of a white color ventrally, green above, with a metallic luster on the sides.

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**DESCRIPTION OF A NEW SPAROID FISH (SPARUS BRACHYSOMUS),  
FROM LOWER CALIFORNIA.**

**By W. N. LOCKINGTON.**

*Sparus brachysomus* n. sp.

D.  $\frac{12}{12}$ ; A.  $\frac{3}{11}$ ; P. 15; V.  $\frac{1}{5}$ ; C. 3-9-8-3; L. lat. cir. 50.

Body compressed, high; snout and forehead rising in nearly a straight line, at an angle of about fifty degrees with the axis of the body, to the occiput. From this point the dorsal outline arches upwards to the third dorsal spine, then downwards in a continuous arch to the end of the dorsal fin. Abdominal outline much less curved than the dorsal, the anal portion more curved than the anterior portion, lower jaw curved, outline between lower jaw and ventrals nearly straight.

Greatest depth  $2\frac{2}{3}$ ; length of head about  $3\frac{1}{11}$ ; dorsal base about  $2\frac{3}{10}$ ; pectoral about  $3\frac{2}{3}$  times in the greatest length; snout (along axis of body)  $\frac{3}{2}$ ; orbit  $4\frac{1}{2}$ ; interocular width  $3\frac{3}{4}$  in the length of the head; least depth of caudal peduncle  $5\frac{1}{4}$  times in the greatest depth.

Posterior extremity of maxillary falling somewhat short of the anterior margin of the orbit, its upper margin concealed beneath the pre-orbital throughout; no prominent knob at upper extremity. Lower jaw shorter than the upper.

Nostrils simple; the posterior a large elongated slit close in front of the orbit and on a level with the lower half of the eye; the anterior a small circular foramen situated at a lower level than the posterior and about one-fourth of the diameter of the eye in advance of it.

Interocular space considerably convex transversely, but only slightly so longitudinally.

Posterior margin of preoperculum straight and vertical, lower line convex, the angle of junction strongly rounded. Operculum ending in a flat point; suboperculum membranous at tip.

Numerous conical teeth in front of the jaws, the anterior row considerably larger than those behind. Three rows of molars in the upper jaw, two in the lower. In the specimens examined there are 9 large incisors in the mandible, forming a bold arc, the interior of which contains about five irregular rows of crowded cardiform teeth, reaching back to the anterior small molars. Upper jaw similar, with 7-10 large incisor teeth.

Number of molars in each row of lower jaw variable, but usually 9 on each side, those of the inner row increasing in size to the last, or to the penultimate, which sometimes exceeds the last in size. Teeth of outer row also increasing in size posteriorly, but to a less extent and less regularly, so that the hinder four molars of the inner row are much larger than their neighbors in the outer row. The two inner rows meet at an acute angle, the anterior pair in contact.

Inner row of molars of intermaxillaries consisting of 21 teeth, of which 6-7 form a row on each side, and increase in size to the hindermost or the one in front of it, while the remainder form a curved line of small tubercular teeth of even size along the inner side of the front of the jaw, behind the band of incisors. Outer row of molars 8 in number, similar to those of the lower jaw. Middle row formed of more numerous (about 14) and, on the whole, smaller teeth than either of the outer rows, increasing in size posteriorly, so that, though the anterior five or six are very small, the posterior ones are about equal in size to the smaller teeth of the outer row. The hindmost four or five teeth of the inner row in all cases exceed greatly in size any teeth in the other rows.

Gill-rakers consisting of clusters of pin-like, slender teeth set upon tubercles; those of the last two pairs of branchial arches largest. The principal clusters of teeth are triangular, with several rows of teeth, the largest behind, the other rows diminishing in length and in size of teeth as they succeed each other anteriorly.

Pharyngeal bones, upper and lower, covered with a dense cluster of teeth similar to those in front of the jaws. The inner row of the lower pharyngeals larger than those in front, which are about four in number, and the anterior teeth rather larger than the posterior.

Dorsal commencing immediately over the pectoral base; first spine about one-fourth the length; second spine eleven-twentieths of length of third; fourth broken in specimen examined; fifth slightly shorter; and the remaining spines decreasing regularly to the twelfth, which is less than half as long as the third.

Rays of soft dorsal twice bifurcate.

Second anal spine longer than the third and about twice as long as the first, which is inserted a little behind the pectoral base; rays twice bifurcate.

Caudal deeply and triangulately emarginate on its hinder border, the free portion of the central rays about one-third the length of that of the outer rays. Outer pair of principal rays undivided, most of the others four times bifurcate.

Fifth ray of pectorals longest, fourth but little shorter, lower rays tapering rapidly, producing a rather narrow elongate fin; rays twice bifurcate.

First soft ray of ventrals longest; rays three times bifurcate.

Scales large, broader than long, slightly striated and scalloped on their engaged margin, posterior margin rounded, anterior somewhat angular, the center advancing. Scales of body subequal, operculum and

preoperculum with rather smaller scales, those of interoperculum smaller still. Margins of orbit scaleless, the scales of occiput, which are rather small, advancing to a point very slightly in advance of the anterior orbital margin. Cheeks, jaws, and fins scaleless.

Lateral line approaching gradually nearer to the dorsal outline toward the posterior portion of the body, and running a little above the center of the caudal peduncle; pores simple.

Color, in alcohol, dark brown on snout and cheeks, fading to silvery on sides and rest of body; behind the pectorals there are traces of golden reflections.

On the orbital margin, just above the posterior nostril, there is a tubercular projection of the bone.

Several specimens of this species were sent from Magdalena Bay, Lower California, by Mr. W. J. Fisher. They were unfortunately in rather bad condition, so that the tips of the rays of the soft dorsal and anal are broken off both in the example described and in others which were carbolized and dried.

One of the examples is in the National Museum, Washington, D. C.

This species should probably be placed in the genus *Culamus* Poey, which includes also the *Pagellus calamus* of Cuv. & Val., but as I have not Poey's work at hand I leave it in the Linnæan genus *Sparus*.

*Dimensions.*

	Inches.
Total length from tip of snout to tip of caudal lobe .....	14.00
Total length from tip of snout to end of middle caudal rays .....	12.37
Greatest depth across pectoral base .....	5.25
Depth of caudal peduncle .....	1.00
Length of head to tip of opercular spine .....	3.42
Tip of snout to upper pectoral axil .....	3.90
Tip of snout to origin of anal .....	7.70
Tip of snout to origin of dorsal, along dorsal outline .....	5.55
Tip of snout to anterior axil of ventrals, along abdominal outline .....	4.35
From orbit to tip of upper jaw, in straight line .....	2.25
Upper margin of orbit to level of center of interocular space .....	.37
Longitudinal diameter of eye .....	.76
Width of interocular space .....	.92
Length of snout .....	1.69
Tip of snout to end of maxillary .....	1.52
Length of pectorals, center ray .....	3.88
Length of ventrals .....	2.40
Length of base of dorsal .....	6.07
Length of base of spinous dorsal .....	3.88
Length of first spine of dorsal .....	.53
Length of second spine of dorsal .....	1.10
Length of third spine of dorsal .....	2.03
Length of fifth spine of dorsal .....	1.97
Length of anal base .....	2.15
Length of first anal spine .....	.45
Length of second anal spine .....	.94
Length of third anal spine .....	.73
Greatest thickness at operculum .....	1.75
Greatest distance from abdominal outline to lateral line .....	4.05



DESCRIPTION OF SEVEN NEW SPECIES OF SEBASTOID FISHES,  
FROM THE COAST OF CALIFORNIA.

By DAVID S. JORDAN and CHARLES H. GILBERT.

The Sebastoid fishes of the coast of California have been referred by Professor Gill to four genera: *Sebastodes* (type *paucispinis*), *Sebastosomus* (type *melanops*), *Sebastomus* (type *rosaceus*), and *Sebastichthys* (type *nigrocinctus*), the first separated by the small size of the scales, the others mainly differentiated by the degree of development in the spines of the head. The genus *Sebastodes* we consider valid, referring to it only *paucispinis*, although the affinities between *paucispinis* and the group termed *Sebastosomus* are not remote, as is shown by the smooth head, protruding lower jaw, small scales, and longer anal fin in the latter group.

The discovery by us of numerous additional species not known to Professor Gill renders it evident to us that the groups *Sebastosomus* and *Sebastomus* cannot be maintained as genera distinct from *Sebastichthys*, and that, in order to recognize them as subgenera even, a different distribution of the species must be adopted.

The Californian species known to Professor Gill are distributed by him as follows:

Genus SEBASTODES.

*paucispinis*.

Genus SEBASTOSOMUS.

*melanops*.

*simulans*.

*flavidus*.

*ovalis*.

*pinniger*.

Genus SEBASTOMUS.

*elongatus*.

*rosaceus*.

*ruber*.

*auriculatus*.

*nebulosus*.

Genus SEBASTICHTHYS.

*nigrocinctus*.

The following arrangement expresses our present views as to the relations of the species known to us, so far as it can be shown in a linear series.

Genus SEBASTODES.

*paucispinis*.

Genus SEBASTICHTHYS.

Series (or subgenus) *Sebastosomus*.

*melanops*.



simulans.

flavidus.

---

 ovalis.
Series (or subgenus) *Sebastichthys*.

atrovirens.

pinniger.

---

 elongatus.

---

 rubrivinctus.

---

 auriculatus.

---

 vexillaris.

---

 chlorostictus.

rosaceus.

constellatus.

---

 ruber.

---

 rastrelliger.

nebulosus.

fasciolaris.

serriceps.

nigrocinctus.

Of the foregoing species we have examined a large series of all except *ovalis*, *rubrivinctus*, and *nigrocinctus*. All the species except *nigrocinctus*, *ovalis*, and *rubrivinctus* are of frequent occurrence in the San Francisco markets.

The characters drawn from the presence or absence of the different pairs of spinous ridges on the top of the head are among the most reliable in this group, although not hitherto accurately given by the describers of the species. Some individual irregularities may be observed, but these are usually readily detected.

For these spines we have adopted the following names: *Nasal*: those near the nostrils; present in all our species of *Sebastichthys*. *Preocular*: for those above the front of the eye; present in all except *flavidus* and *simulans*. In *melanops* the ridge is present, but it usually does not end in a spine. *Supraocular*: above the eye; present in all but *simulans*, *melanops*, and *flavidus*. *Postocular*: close behind these; present in most of the red species, usually wanting in others. *Tympanic*: behind the postocular, and generally present. *Occipital*: long ridges on the posterior part of the head on each side of the occipital crest. These ridges end in spines in all except *melanops*, *simulans*, and *flavidus*. *Coronal*:

a pair of distinct spinous ridges in front of the occipital ridge; present in one species only—*auriculatus*. *Nuchal*: close behind the occipital; in one species (*serriceps*) large and distinct, in the others either wanting or often coalescent with the preceding.

Two suprascapular spines are present in all the species except *auriculatus*, which has three on each side.

The following table gives the names of the spinigerous ridges on the top of the head *usually* present in each species, beginning with those in which the ridges are least elevated:

	Pairs.
<i>Paucispinis</i> , preocular, occipital.....	2
<i>Flavidus</i> , nasal.....	1
<i>Melanops</i> , nasal and preocular.....	1 or 2
<i>Simulans</i> , nasal.....	1
<i>Ocalis</i> , nasal, preocular, supraocular, postocular, tympanic, and occipital.....	6
<i>Pinniger</i> , nasal, preocular, supraocular, postocular, tympanic, occipital.....	6
<i>Atrovirens</i> , nasal, preocular, supraocular, occipital, and sometimes tympanic...	4 or 5
<i>Elongatus</i> , nasal, preocular, supraocular, tympanic, occipital.....	5
<i>Rastrelliger</i> , nasal, preocular, supraocular, tympanic, occipital.....	5
<i>Auriculatus</i> , nasal, preocular, supraocular, tympanic, coronal, occipital, and often nuchal.....	7
<i>Rexillaris</i> , nasal, preocular, supraocular, occipital, and sometimes tympanic ...	4 or 5
<i>Chlorostictus</i> , nasal, preocular, supraocular, postocular, tympanic, occipital ....	6
<i>Rubrinectus</i> , nasal, preocular, supraocular, tympanic, occipital.....	5
<i>Rosaceus</i> , nasal, preocular, supraocular, postocular, tympanic, occipital.....	6
<i>Constellatus</i> , nasal, preocular, supraocular, postocular, tympanic, occipital.....	6
<i>Nebulosus</i> , nasal, preocular, supraocular, tympanic, occipital.....	5
<i>Ruber</i> , nasal, preocular, supraocular, postocular, tympanic, occipital.....	6
<i>Fasciolaris</i> , nasal, preocular, supraocular, tympanic, occipital.....	5
<i>Serriceps</i> , nasal, preocular, supraocular, tympanic, occipital, nuchal.....	6
<i>Nigrocinctus</i> , nasal, preocular, supraocular, postocular, occipital.....	5

The character of the gill-rakers has been hitherto unnoticed. In this regard the species may be grouped as follows:

1. Long and slender: *flavidus*, *simulans*, *ocalis*, *pinniger*, *melanops*, *atrovirens*.
2. Long and rather strong: *rexillaris*, *elongatus*, *chlorostictus*, *rosaceus*.
3. Stout and rather short, usually not clavate, but constricted toward the tips: *rubrinectus*, *auriculatus*, *constellatus*, *ruber*.
4. Stout, short, compressed, and clavate: *nebulosus*, *fasciolaris*, *serriceps*, *nigrocinctus*.
5. Very short, broader than high: *rastrelliger*.

SEBASTICHTHYS ATROVIRENS sp. nov.

Allied to *S. pinniger*. Body oblong, not very stout, not tapering rapidly backward. Head moderate, rather pointed, its upper outline with a slightly curved slope from the snout to the nuchal region.

Mouth moderate, not very oblique, the lower jaw little projecting, the rather slender maxillary extending to the posterior border of the pupil; the premaxillary below the horizon of the pupil. Maxillary largely scaly. Eye large, about three and a half times in length of head.

Ridges on top of head rather low, not ending in very prominent spines. The following pairs are present: *Nasal, preocular, supraocular*, and *occipital*, four in all. Occasionally the tympanic spine is also developed, although very small. The nasal spines are quite prominent. The preocular and superocular moderately so, but short. The occipital spines are comparatively short and low.

Preorbital bone with the neck very narrow, scarcely one-fifth the diameter of the eye, provided anteriorly with two stout spines, which project backward.

Preopercular spines short, but rather sharp, the second longer and slenderer than the others, all of them pointed. Subopercle and interopercle with spines. Opercular and suprascapular spines sharp.

Interorbital space rather broad and slightly convex, widened backward, a little depressed on each side next the supraocular spine, its width less than that of the eye and more than the length of the occipital spine.

Gill-rakers long and slender, but stouter, rougher, and shorter than in *S. pinniger*, 9 above the angle and about 22 below; the longest two-fifths the diameter of the eye, about half the interorbital space.

Scales on the head rather large, about 15 in a cross-series on the cheeks above the suborbital stay. Preorbital scaly.

Scales on body large and somewhat more regularly arranged than usual. Accessory scales present, but not numerous; 52 transverse series of scales.

Dorsal spines moderate, the fifth and sixth spines highest, the others regularly shortened each way, the twelfth about as long as the first, the membrane joining the thirteenth less than half way up; the highest spine rather less than half the length of the head and lower than the soft rays, which are rather high. Caudal slightly rounded.

Anal fin short and high, its spines slender, the second shorter than the third, and not much stronger. Pectorals long and narrow, reaching past the vent and nearly to the beginning of the anal, their length seven-eighths that of the head, *their base quite narrow*, less than the diameter of the eye. Ventrals long, reaching just past the vent.

D. XII, I, 14; A. III, 7.

Color similar to that of *S. rastrelliger*, but paler, usually olive-green, marbled with darker; belly pale yellowish green; fins olivaceous. Sometimes this species is quite dark, but it never shows red tints either on body or fins.

This species is closely related to *S. pinniger*, from which it differs in the absence of the postocular and tympanic spines and in the coloration, *S. pinniger* being always chiefly orange-red. Externally it resembles *S. rastrelliger* most, but it may be known at once from the latter species by the long gill rakers and narrow pectorals.

*S. atrovirens* is very abundant from Point Concepcion as far as San Diego. About Catilina Island it is the most abundant species of the

genus. It is frequently seen in the San Francisco markets. It reaches a length of about 15 inches, and is usually known as Garrupa or Grouper.

SEBASTICHTHYS RUBRIVINCTUS sp. nov.

Body robust, rather deep and compressed, tapering behind to a slender caudal peduncle.

Head long, acute in profile, there being a nearly straight slope from a bony prominence in front of the spinous dorsal to the tip of the lower jaw. Mouth rather large, oblique, the lower jaw strongly projecting. Maxillary broad, scaleless, extending to opposite the middle of the eye; anterior edge of premaxillary on the level of the lower border of the eye.

Ridges on top of head quite low, five pairs of them ending in spines, which are bluntnish and depressed. *Nasal, preocular, supraocular, tympanic*, and *occipital* spines present. In one example the nasal spines are covered by the skin. Ocular ridges not much elevated.

Interorbital space flattish, narrow, not so broad as the eye, not widened behind, covered with rather sparse, almost cycloid, scales. Two long frontal ridges extend the length of the interorbital space. These are covered with bare skin. Behind and between these are two shorter ridges occupying the place of the coronal ridges found in *S. auriculatus*. These two are covered by naked skin, and do not end in spines. Tympanic spines well developed. Occipital ridges long, curved, diverging behind.

Suborbital stay very prominent, its tip nearly reaching the preopercle.

Preopercle with five very strong spines, the three uppermost very long and sharp, the second the longest. Subopercle and interopercle entire. Opercle above with two sharp, long spines. Suprascapular with two strong spines. Preorbital very wide, its neck two-fifths the diameter of the eye, with one sharp spine and a large prominence, which usually ends in a spine also.

Eye extremely large, its diameter  $3\frac{3}{4}$  in length of head.

Gill-rakers rather short, rather robust, much compressed, toothed on the inner margin, the longest about one-fourth the length of the eye. Gill-rakers  $8 + 20$  in number, about  $4 + 16$  of them being free.

Scales on head all small and thin, mostly cycloid, the minute accessory scales extremely numerous. Scales of body smoother than usual, the accessory scales numerous on the posterior part and on the nuchal region, where the scales generally are smaller and more crowded than on the flanks.

Dorsal spines robust, rather high, the fifth the highest, not quite half the length of the head; those behind rapidly shortened to the twelfth; the twelfth spine lower than the first and much less than half the height of the fifth, its membrane joining the thirteenth spine below its middle. Soft rays about equal in height to the spines. Caudal fin very slightly emarginate. Anal rather low, its second spine much longer and stronger than the third, both robust. Pectorals moderate, not reaching vent;



the base moderate, nearly equal to the diameter of the eye. Ventrals not reaching tips of pectorals.

D. XIII, 14; A. III, 7. Scales in about 48 transverse series.

Color very pale rose-red, almost white, with cross-bars of a deep, intense crimson-red, these bands broadest on the back. One of the bands runs across the eye, snout, suborbital, and maxillary, with indistinct boundaries; the next across the nuchal region and front of dorsal and opercle; the next across the middle of the spinous dorsal, including the ventrals and the posterior half of the pectorals; another across the soft dorsal and anal; another across the base of the caudal, the fin itself being deep rose color. The other fins share the color of that part of the body against which they lie.

This species is known from two examples, each about one foot long, taken on a reef in Santa Barbara Channel, by J. Weinmiller, February 14, 1880.

Afterwards about eight others, larger than the original types, were taken in deep water near Monterey. It is known to the fishermen as the "Spanish Flag," and is the most brilliantly colored large fish on the Pacific coast.

Its relations to the other red species are not intimate.

#### SEBASTICHTHYS VEXILLARIS sp. nov.

Body stout and compressed; the back elevated; the form rather deeper and more elliptical than in the other red species. Head moderate; the profile moderately acute. Mouth rather large, moderately oblique, the broad maxillary usually extending to a point somewhat behind the orbit. Premaxillary anteriorly on the level of the lower edge of the pupil. Jaws subequal, the lower somewhat projecting, but without symphyseal knob; the upper jaw not emarginate.

Ridges on top of head long and low, rather broader and lower than in the other red species; their spines rather depressed. The following pairs of spines are present, four or five in all: *Nasal*, *preocular*, *supraocular*, *occipital*, and sometimes *tympanic*. The nasal spines are prominent; the preocular spines are quite conspicuous and extend well backward; the supraocular ridge is depressed and broad, its spine triangular; the occipital spines are rather long and diverge backward. In some specimens a tympanic spine is present, which is wanting in the others. The interorbital space is broad and flattish, broader than in related species, about equal to the diameter of the orbit. It is occupied by two raised ridges, which are covered by the scales. In large specimens these ridges are quite obscure.

Preopercular spines moderate; some of them usually divided into two, three, or four at tip, the middle one the largest. The degree of division of these spines is quite variable, but at least the middle spine is usually divided.

Posterior border of the interopercle with a strong spine, above which



are one to three conspicuous spines on the subopercle. Opercle with two diverging spines, above which are two suprascapular spines.

Eye moderate, high up, 4 to  $4\frac{1}{2}$  in head. Preorbital with the neck very broad, with two bluntish downward-directed spines in front, its narrowest portion two-fifths the diameter of the eye. Suborbital stay short and rather weak. Maxillary and preorbital with fine scales.

Gill-rakers rather long and strong, compressed, toothed on the inner margin, shorter than in *atrovirens*, the longest slightly clavate, about half the length of the eye; the number about  $\frac{8}{19}$ , nearly all of them free.

Scales moderate, with few accessory smaller ones, in 55 transverse series.

Dorsal spines very strong and high, about as in *chlorostictus*, higher than in any other species; the first about half as long as the eye; the fourth the highest, more than half the length of the head, and much higher than the soft rays. The twelfth spine is a little higher than the first, and its membrane joins the thirteenth about half-way up. Membrane of spinous dorsal rather more deeply incised than in other species. Soft dorsal rather high, but lower than the spines.

Anal spines much smaller than in *rosaceus*, etc.; the second not longer than the third, and not much stronger; about two-thirds as high as the soft rays. Soft rays of anal high. Caudal truncate. Pectoral shorter than head, not reaching the vent; its base rather broad.

Ventrals moderate, not reaching vent.

D. XIII, 16; A. III, 6.

Color rather bright and pale, yellowish red, becoming lighter below, the reddish and yellowish forming large and irregular areas, sometimes one shade predominating, sometimes the other. A pink cross-blotch on the back at the base of the second and third dorsal spines. Upper parts of the head mostly pink, with broad olive shades running backward, one on the lower lip, one on the maxillary, one from preorbital region downward, one from the eye backward and downward across the cheeks, and another across the opercular spines. Fins all pinkish red; the membranes olive. Top of head usually with alternating cross-shades of pinkish and yellowish. In some specimens the yellowish shades are replaced by light olive. Others are quite red; others still are quite brownish. The spots on the back show a tendency to the rosy spots found in *constellatus* and *rosaceus*.

This species was first known to us from two specimens taken on a reef in Santa Barbara Channel. A single example was afterwards noticed in the museum of the California Academy of Sciences, and numerous others have been since obtained in the San Francisco markets, where it is very common. It reaches a larger size than its relatives, *chlorostictus* and *constellatus*, found in the same markets, and, like them, it has been confounded by previous observers with *rosaceus* and *auriculatus*. It may be known from its relatives by its high dorsal spines, low

anal spines, and the smaller number of ridges on the top of the head. Its relations are probably more near to *S. nebulosus* than to the other red species.

SEBASTICHTHYS CHILOROSTICTUS sp. nov.

Body oblong, tapering into a rather slender caudal peduncle, the back not much elevated. Head moderate, the profile rather steep, with a nearly even slope.

Mouth large, oblique, the maxillary reaching to behind the pupil, the premaxillary in front below the level of the large eye. Jaws equal in the closed mouth, the tip of the lower fitting into the emarginate upper jaw; a rather conspicuous symphyseal knob. Preorbital sinuate, usually with two or three flat spines.

Ridges on top of head rather sharp and high, ending in sharp spines. These ridges are longer than in *nebulosus* and *serriceps*, and much less elevated. These ridges are much higher than in *vexillaris*; about as in *constellatus*.

The following pairs of spines are present: *Nasal*, *preocular*, *supraocular*, *postocular*, *tympanic*, and *occipital*—6 pairs.

Interorbital space concave, with two rather prominent ridges.

Preopercular spines rather sharp, the second longest and slenderest; the lower bluntish, but well developed. Opercular spines sharp; suprascapular spines well developed. A spine on interopercle and on subopercle.

Gill-rakers long and rather strong, not clavate, the longest about two-fifths the diameter of the eye. They are longer than in any other of the red group, rather longer than in *vexillaris*. Scales on head less developed than in *S. constellatus*; the snout wholly free from scales. Mandible nearly or quite naked. Scales on body moderate, in about 55 transverse series.

Dorsal spines very high, nearly as high as in *vexillaris*; the fourth highest, one-third higher than the soft rays, which are also considerably elevated.

Dorsal fin rather deeply emarginate; caudal fin emarginate; anal fin not very high, its second spine much higher and stronger than the third, about as high as the soft rays. Pectorals with moderate base reaching beyond tips of ventrals, about to vent.

D. XIII, 14; A. III, 6.

Color rather light olivaceous above, and pinkish overlaid with golden on the sides. Head light red and golden. Three roundish light spots placed as in *constellatus* and *rosaceus*, but much less distinct. There are no small light spots on the body. The upper parts of the body, from just below the lateral line, are closely covered with small round spots of a clear olive-green. These spots are most distinct on the back and the top of the head. On the sides of the body, just above and below the lateral line, these spots form two continuous series, following the course

of the lateral line. Eyes above with green spots. Fins nearly plain red; the dorsal spotted with olive.

This species is known to us from numerous specimens obtained in the San Francisco market, taken in deep water at Monterey. It is not rare, but it has been hitherto confounded with *rosaceus*, from which it may be known at once by the green spots and the great height of the dorsal.

SEBASTICHTHYS CONSTELLATUS sp. nov.

Body rather robust, heavy forwards, tapering into a rather slender caudal peduncle. Head rather pointed in profile, the slope nearly straight from the tip of the snout to the base of the dorsal.

Mouth large, oblique, the lower jaw slightly projecting beyond the emarginated tip of the upper jaw. A conspicuous knob just beyond the symphysis of the lower jaw.

Maxillary very broad, extending to beyond the line of the pupil, its middle part with many small scales; premaxillary in front just below the level of the eye.

Ridges on top of the head well developed, rather high and narrow, ending in moderate spines. The following pairs are present: *Nasal*, *preocular*, *supraocular*, *postocular*, *tympanic*, and *occipital*. The inter-orbital area has two prominent ridges covered by the scales, and not ending in spines. Behind these is a deep concavity. The nasal spines are bluntish, the preocular sharp, the supraocular ridge rather short, the postocular and tympanic similar to each other. The occipital ridge is long, curved, ending in a sharp spine. Two suprascapular spines. Preopercle with its first and third spines triangular, bluntish, the second long and sharp, the fourth and fifth reduced to bluntish prominences. Opercle with two strong spines above. Slight spines on the subopercle and interopercle.

Preorbital wide, its neck about one-third the diameter of the orbit, its edge lobed, without spines.

Eye large,  $4\frac{1}{2}$  in head.

Muzzle and preorbital scaled to the tip of the snout more completely than in other species, mandible scaly.

Gill-rakers short, very thick, compressed, clavate, with a tuft of spine-like teeth at tip, the longest of them about one-fifth the diameter of the eye, their number  $3 + 24$  free ones, besides rudiments. Scales strongly ctenoid, the accessory scales largely developed; 53 transverse series.

Dorsal spines rather strong, rather low, the fourth the longest, a little more than one-third the length of the head. Twelfth spine rather short, shorter than the first, its membrane joining the thirteenth spine about half-way up.

Soft dorsal rather low, about equal to the spines.

Anal with the second spine robust, curved, considerably longer than the third, higher than the soft rays. Caudal very slightly emarginate.

Pectorals reaching beyond tips of ventrals, about to vent, their length two-thirds that of the head.

D. XIII, 13; A. III, 6.

Head densely covered with small scales; a series across the cheeks along the upper edge of the suborbital stay usually numbering 30 to 40, the increased number being due to the greater development of the accessory scales.

Color rather light, bright orange-red, the back olive shaded, the belly yellowish. Cheeks with red and yellowish shades. Head and body everywhere closely covered with small roundish pale spots. The spots above are light rose color; below are nearly white and larger. Four or five roundish rose-colored spots on the back, besides some mottlings of a similar shade. The first spot, often obscure, under the fourth dorsal spine; the next near the lateral line under the eighth dorsal spine; the next close to the junction of the two parts of the dorsal; the fourth under the end of the soft dorsal; a fifth sometimes near the base of eighth dorsal spine. Opercular flap with a rosy spot. Fins light reddish, shaded with olive, or nearly uniform. Dorsal speckled at base with light and dark.

This beautiful species was first noticed by us in Santa Barbara Channel, where a single example was obtained. It is abundant in the markets of San Francisco, where it has been confounded with *rosaceus* on account of the similarity of the pink spots. The numerous stellate light spots, however, distinguish it at sight. It is very closely related to *rosaceus*, however.

The discovery of three species in the waters of California having the light spots supposed to distinguish *S. rosaceus*, invalidates the identification of that species with the similarly spotted *S. oculatus* of Chili.

#### SEBASTICHTHYS RASTRELLIGER sp. nov.

Body rather oblong, deepest at the shoulders, slowly tapering backward to a rather deep caudal peduncle; head short, rather blunt and deep, the upper profile straight; mouth moderate, little oblique, the maxillary reaching to the posterior margin of the eye, the premaxillary rather below the level of the eye; jaws equal, the lower convex, not produced at tip, and without symphyseal knob.

Preorbital bone moderate, the width of its neck about two-fifths the diameter of the eye, its free margin sinuate, without spines.

Eye moderate, anterior, its diameter about  $4\frac{1}{2}$  in head.

Ridges on head strong, but broad and depressed, ending in small spines. The following pairs present: *Nasal*, *preocular*, *supraocular*, *tympanic*, and *occipital*, five in all. The occipital ridges are very long, equaling the diameter of the orbit; preopercular spines short and stout, the two upper subequal; opercular spines usually very broad and flat, their posterior edge sometimes serrated or bifid; suprascapular spines strong; spines on interopercle and subopercle small, sometimes obsolete; inter-



orbital space moderate, less than the diameter of the eye, flattish, with two low ridges; spines of head little divergent backwards.

Gill-rakers *very short*, wide, compressed, the longest as wide as high, the shortest much wider and not free, all strongly toothed on anterior margin and side; the number about  $\frac{7}{14}$ , only 6 to 9 of them being movable.

Scales on body large, the accessory scales almost wanting; about 45 transverse series, and about 50 in the course of the lateral line.

Dorsal spines low, the fifth highest, about two-fifths the length of the head; the last spines not much shortened; the fin comparatively little emarginate; soft rays considerably higher than the spines. Caudal fin slightly rounded. Anal fin short and high, its spines low, the second as high as the third and much stouter. Pectorals rather short, reaching vent, *their base extremely broad*, its width greater than the length of the eye and about one-third the length of the head; the lower rays much thickened. Ventrals moderate, not quite reaching the tips of the pectorals.

D. XIII, 13; A. III, 6.

Color blackish green, with paler mottlings, the sides spotted with darker; belly pale greenish, often many scales on the side, each with a darker spot; paired fins dark, often tinged with reddish; other fins chiefly olivaceous, mottled with darker; anal fin often spotted with black. The brightness of the olive and greenish shades is quite variable, but the species is always without bands or distinct markings and without distinct red.

This species is extremely abundant from Point Concepcion to Santa Catalina Island, and large numbers come into the San Francisco market. It may be known at once from all the others by the small gill-rakers ("rastra") and by the breadth of its pectoral fins. It grows to the length of about 15 inches.

*S. rastrelliger* is intermediate, in regard to the development of the spines, between the groups termed *Sebastomus* and *Sebastosomus* by Professor Gill. Its relations with *S. nebulosus* are most intimate, and it forms the base of a series ascending in degree of roughness of head, terminating in the extreme of *S. nigrocinctus*.

#### SEBASTICHTHYS FASCIOLARIS Lockington, nom. sp. nov.

(*Sebastes fasciatus* Girard, not of Storer.)

The form described and figured by Girard as *Sebastes fasciatus* is, in our opinion, specifically distinct from *Sebastes nebulosus* of Ayres, with which it has usually been identified.

The name *fasciatus* is preoccupied in this group. We have therefore adopted the above name, proposed by Mr. Lockington in MSS.

*Sebastichthys fasciolaris* is very closely related to *S. nebulosus*. It is rather stouter, and the slope of the profile is steeper. The ridges on



the top of the head are much higher and stronger, especially the occipital ridge, which forms a wall-like elevation, much as in *S. serripes*. The sides of this ridge are vertical, or even directed upward.

The color of this species is very constant and quite distinct from that of *nebulosus*. It is nearly black, everywhere speckled with whitish. There are coarse yellowish blotches on the sides of the head and body, and a broad, yellowish, lateral band. This band begins on the membrane of the third and fourth dorsal spines, and extends downward to the lateral line, which it follows to the tail. The edges of this band are very uneven, and it is of varying width, but it is always distinct and continuous. The body is mottled with light and dark, and the fins are all blackish, with pale spots.

In the bluntish spines of the sides of the head, the horizontal mouth, with shortish subequal jaws, the short, thickish gill-rakers, the high dorsal spines, and moderate, subequal anal spines, this species agrees with *S. nebulosus*. Both species are common in the San Francisco market, in about equal abundance.

*Measurements in hundredths of length to base of caudal.*

	<i>Serriceps</i> .	<i>Rastrelliger</i> .	<i>Atravirens</i> .	<i>Rubrivinctus</i> .	<i>Vexillaris</i> .	<i>Chlorostictus</i> .	<i>Constellatus</i> .
Body:							
Greatest height .....	38	36	35.5	40	36	34.5	41
Least height of tail .....	11	12	12	10	12.5	9.5	9
Head:							
Greatest length .....	35	41	37.5	38	37.2	40	42
Snout .....	10	9	9.2	11	8.5	10	11.3
Orbit .....	8.5	8.5	11	9.5	8	-----	11.5
Interorbital space .....	5	6	8	5.7	7	6.8	6
Least width of preorbital .....	3	2.5	1.5	3	2	-----	2.5
Maxillary .....	18	20	17	16	17.5	18.5	20.6
Longest gill-raker .....	2.5	1.5	3.5	2.3	3	3.8	4
Occipital ridge .....	6	8	6	9.3	6.5	7.5	8
Supraocular ridge .....	5	6	6	6	5	5.2	6
Dorsal:							
Snout to dorsal .....	32.5	35	35	38	33	36.2	40
Longest spine .....	13	13	16	16	21	21.5	15
Longest ray .....	15.5	16	19	15	15.2	16.7	14
Anal:							
Base .....	13.5	15	15	12.5	15	13	-----
Second spine .....	14	12	14.5	15	14.6	16.6	16
Third spine .....	14	9	15	13.5	12.2	14.5	13
Longest ray .....	22	19	20	20	20	18	15
Caudal length .....	20.5	20	21	15.3	17.5	18	18.5
Pectoral length .....	27	27	32	24	27	-----	24
Width of base .....	11	11	8.8	9.5	11	9.5	10
Ventral length .....	26.5	22	24.5	19.5	22	21	18
Dorsal .....	XIII, 13	XIII, 13	XIII, 14	XIII, 14	XIII, 13	XIII, 13	XIII, 14
Anal .....	III, 5	III, 6	III, 7	III, 7	III, 6	III, 6	III, 6
Transverse rows of scales, ..	55	47	47	50	56	42	48
Length to base of caudal, in inches .....	8.7	9.25	7.25	9.7	11.3	9.3	6.23
Extreme length, in inches .....	10.4	11.3	8.75	11.3	14.25	11.2	8.55

SAN FRANCISCO, CAL., February 28, 1880.

NOTE.—The publication of this paper has been accidentally delayed for some time. Meanwhile the writers have discovered a number of additional species of *Sebastichthys* descriptions of which precede those of the present species, although of course no allusion is made to them in this earlier paper.

**DESCRIPTION OF A NEW ENBIOTOCOID (*ABEONA AURORA*),  
FROM MONTEREY, CALIFORNIA, WITH NOTES ON A RELATED  
SPECIES.**

**By DAVID S. JORDAN and CHARLES H. GILBERT.**

Body very elongate, with dorsal and ventral outlines evenly curved; caudal peduncle very long, thick at base; snout blunt and rounded, top of head everywhere transversely convex and the occipital region but little depressed.

Mouth small and oblique, the lower jaw somewhat shorter than the upper and included. The maxillary reaches but two-thirds the distance to front of orbit; premaxillaries anteriorly about on a level with lower rim of orbit.

Teeth long and strong, somewhat compressed and incisor-like, arranged in a close series; each tooth with three short-rounded lobes near the end, the middle lobe the longest; their form precisely as in *Abeona minima*. These incisor teeth are crowded, with the lobes overlapping, and often with one slipped entirely behind the others.

Scales of cheeks in three distinct series below, in one posteriorly. Behind this outer row and well separated from it are, in the upper jaw, from two to several distinct canines, there being usually a pair near the middle of the jaw. Gill-rakers rather feeble, of moderate length. Lower lip thin, with a frenum.

Dorsal fin with the spines from the fifth or sixth to the eleventh, longer than the others, about equal to each other and to the longest soft ray. Pectorals not reaching as far as do the ventrals, which scarcely reach the vent. Caudal forked for nearly half its length. Ventral groove almost obsolete; the distance from ventrals to vent about equals the length of the anal fin.

Lateral line with 40 to 45 scales (4-43-13).

Color bluish black above, becoming lighter on lower half of sides silvery below. Opercles and lower half of sides punctate with black dots and shaded with light orange or rose red, the latter here more intense on the centers of the scales. A broad grayish area extending backward from the axil of the pectorals, without orange tints and darkened by black punctulations on the edges of the scales; this area ends opposite the origin of the anal fin; above it the orange shade forms a rather distinct band from the lips to the base of the caudal. Axil of pectorals black, especially above. Fins plain, speckled with blackish. Anal somewhat yellow.

Fin rays: D. VIII, 17; A. III, 26.

The intestines were filled with a species of *Ulva*, indicating a vegetable diet.

This species is known to us from fifteen examples taken in the bay of Monterey, and purchased by us in the San Francisco market.

It agrees with *Abconia minima* in the peculiar dentition characteristic of that genus, as well as in the large scales and shortened fins. Its form is, however, quite different, resembling more the genera *Brachyistius* and *Cymatogaster*. It is a considerably larger fish than *Abconia minima*; its dorsal spines are weaker and the number of fin rays is greater.

(D. IX, 14; A. III, 16—in *Abconia minima*.)

From *Cymatogaster aggregatus* it is widely separated by the different dentition; with *Brachyistius frenatus* Gill it has closer affinities, but the two species belong to different genera.

This latter species has been but once observed, and no description has been yet published, merely a brief note enumerating some of its peculiarities. We therefore subjoin a fuller account, drawn from a fine specimen obtained by us at Santa Barbara.

#### BRACHYISTIUS FRENATUS Gill.\*

(Proc. Acad. Nat. Sci. Phila., 1862, 275.)

Body elongate, compressed, the body proper regularly elliptical, with long caudal peduncle. Head long, very slender and pointed, much depressed above the eyes, the snout projecting. Mouth very small, terminal oblique, the small maxillary falling much short of the orbit. Lips rather thin, the lower with a frenum. Teeth long and slender, somewhat lanceolate, few in number, arranged in a single series.

Preorbital broad. Cheeks with about two rows of scales; opercles with three. Eye large, anterior, about 3 in head.

Gill-rakers numerous, long and slender.

Scales large, 42 in the course of the lateral line. Dorsal spines high and rather strong, the first low, the others rapidly increasing to the sixth and seventh, the eighth shorter, the soft rays a little higher than the highest spines.

Caudal peduncle nearly as long as the head, not very slender. Caudal fin rather deeply forked.

Anal spines feeble, the fin elevated in front. Ventrals reaching soft rays of anal. Pectorals reaching first anal spine. Ventral groove very short.

D. VIII, 15; A. III, 22.

Color dark olive-brown above, with lighter stripes along the rows of scales. Below everywhere a brilliant light coppery red; each scale with a light blue spot and dark punctulations. Head colored like the body. Fins all light reddish, plain, the dorsal somewhat dusky. A streak of sky-blue spots below and in front of the eye.

#### Measurements of *Abconia aurora*.

Extreme length .....	6.93 inches	
Length to base of caudal.....	5.57 inches =	100

\* We have since obtained this species in very great numbers at various places along the coast from Los Angeles to Vancouver's Island. *Ditrema brevipinne* Günther is undoubtedly the same species.

Body :	
Greatest depth.....	36
Least depth of tail.....	14
Length of caudal peduncle .....	21
Head :	
Greatest length .....	25.5
Width of interorbital area.....	9
Length of snout.....	7
Length of maxillary.....	6
Diameter of eye.....	7
Dorsal :	
Distance from snout.....	37.5
Length of base.....	43.5
Height of longest spine.....	12
Height of highest soft ray .....	12
Anal :	
Length of base.....	16.5
Height of longest ray .....	9
Caudal :	
Length of middle rays.....	13.2
Length of outer rays .....	25
Pectoral, length.....	24
Ventral, length .....	19
Dorsal rays .....	VIII, 17
Anal rays.....	III, 20
Scales .....	4-43-13
Transverse series below lateral line .....	35

SAN FRANCISCO, CAL., *February 28, 1880.*

**DESCRIPTION OF A NEW FLOUNDER (PLATYSOMATICHTHYS STONIAS), FROM THE COAST OF CALIFORNIA.**

**By DAVID S. JORDAN and CHARLES H. GILBERT.**

Body extremely elongate for the family, thin, and strongly compressed. Head rather long and slender; the snout somewhat pointed. Mouth extremely large and oblique, the lower jaw included; the maxillary very long and slender, reaching much beyond the eye, its length about half that of the head. Premaxillary in front above the level of the lower eye.

Teeth in the upper jaw anteriorly long, slender, and wide-set. Some of the teeth very freely depressible, the larger ones scarcely movable. Posteriorly the teeth are much smaller, close-set, and fixed in two rows; the inner row continuous with the larger anterior series, the outer row extending outside of some of the enlarged teeth.

Teeth in the lower jaw very sharp and slender, long, and wide-set, alternating with shorter ones, which are very freely depressible. Outside of the larger teeth is a series of small, fixed, close-set teeth. The larger teeth in each jaw are distinctly arrow-shaped. Pharyngeal teeth apparently in one row.



Eyes large, dextral, their anterior margins about even with each other; the upper eye larger and directed obliquely upward. A conspicuous ocular ridge about the upper eye, becoming continuous with the lateral line. Interorbital space narrow, not half the width of the eye, scaly, as is the space in front of it. Cheeks wide, the posterior edge of the preopercle free. Opercle rather short and weak. Premaxillary protractile, capable of little protrusion.

Gill-rakers long and strong, about  $4 + 13$  in number, the longest more than half the diameter of the eye.

Scales very small and thin, irregularly arranged, their margins weakly ciliated, in about 135 transverse series; about 100 tubes in the course of the lateral line. The lateral line is nearly straight, gently ascending in front. No accessory lines. Scales on blind side similar.

Dorsal fin beginning just behind the middle of the eye, its rays low, especially anteriorly, its greatest height considerably behind the middle. Caudal fin somewhat forked. Anal fin higher than the dorsal, its highest rays about midway. No spine before anal. Caudal peduncle long and slender, about as long as the maxillary. Pectoral fins short, the one on the right or eyed side longest, its length nearly equal to that of the maxillary. Ventral fins very short, reaching just past the vent.

Fin rays: D. 101; A. 85.

Color plain brown, with darker punctulations. Left side white, the many dark points giving it a soiled appearance. Fins dusky.

This species is known to us from one example over a foot long, bought in the San Francisco market, and taken just outside the Golden Gate. It doubtless reaches a much larger size, and the adult is probably less slender than this example.

It differs from its congener, the Greenland Halibut, *Platysomatichthys hippoglossoides*, of the North Atlantic, in the slenderer body, larger mouth, longer gill-rakers, and narrow interorbital space, but the two appear to agree in all respects of generic value.

We regret the necessity of using the clumsy and inappropriate generic name *Platysomatichthys* for these fishes instead of the name *Reinhardtius* proposed by Professor Gill. The former name, although later in date, has priority of definition.\*

*Table of measurements of Platysomatichthys stomias.*

Extreme length .....	12.9 inches
Length to base of caudal .....	10.9 inches = 100
Greatest depth of body .....	.30
Least depth .....	.07
Length of caudal peduncle .....	.12
Length of head .....	.28
Number of gill-rakers .....	4, 11
Length of longest gill-raker .....	.032
Length of snout .....	.068
Length of maxillary .....	.152

\* In a paper written later, but by accident printed earlier (Proc. U. S. Nat. Mus., 1880, 51), we have recognized this species as the type of a distinct genus, *Atheresthes*.



Length of mandible .....	.168
Greatest width of maxillary .....	.03
Diameter of orbit .....	.07
Distance from snout to dorsal .....	.116
Length of base of dorsal.....	.79
Greatest height of dorsal .....	.094
Distance from snout to anal.....	.346
Length of base of anal .....	.615
Height of longest ray.....	.105
Length of middle caudal rays.....	.142
Length of outer caudal rays .....	.185
Distance from snout to pectoral .....	.295
Length of pectoral (right side).....	.128
Distance from snout to ventral.....	.127
Length of neutral .....	.057
Dorsal rays.....	101
Anal rays .....	85
Number of tubes in lateral line.....	98

SAN FRANCISCO, CAL., *March 1, 1880.*

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**DESCRIPTION OF A NEW EMBIOTOCOID FISH (CYMATOGASTER ROSACEUS), FROM THE COAST OF CALIFORNIA.**

**By DAVID S. JORDAN and CHARLES H. GILBERT.**

Body rather elongate, deepest at the shoulders; the profile thence to the occiput convex, the occipital and interorbital region considerably depressed; body tapering backwards from the shoulders into a short and slender caudal peduncle.

Head small, thick, the snout blunt. Mouth rather large, little oblique, the lower jaw included; maxillary slightly passing the vertical from the front of the orbit; premaxillary anteriorly on a level with the inferior margin of the pupil. Eye very large, its diameter about one-third the length of the head; interorbital region very broad. Lower lip with a narrow frenum, above which its margin is narrowly free.

Teeth large, in a single row, much as in *Cymatogaster frenatus*, but blunter, slightly compressed and truncate at tip, somewhat incisor-like, the edge, however, entire. Teeth few and distant, about  $\frac{12}{8}$ ; none on the sides of the lower jaw. They are larger, blunter, and more wide-set than in *Cymatogaster aggregatus*.

Scales on the cheeks in three series below.

Gill-rakers small and weak, much as in *Cymatogaster aggregatus*, curved and apparently smooth.

Scales large, but rather smaller than in any of the related species, 50 in the course of the lateral line.

Spinous dorsal high; the first spine two-fifths the length of the highest; the sixth to tenth of nearly equal height, and higher than the soft rays. Anal fin with the base oblique and convex, the spines rather strong, more or less curved, as in *Abconia*.

Caudal fin narrow, forked for more than half its length, the lobes rather pointed. Pectoral fins small, not reaching to the tips of the ventrals, which attain the anal.

Fin rays: D. X, 18; A. III, 20.

Color in alcohol silvery, strongly flushed with rose-red, darker above. Top of head orange. A very distinct oblong chocolate-colored spot above the lateral line at the origin of the soft dorsal fin. Another much smaller one just below the end of the soft dorsal. Fins immaculate, slightly tinged with reddish. In life the color was silvery, with the rosy flush less distinct.

This species is known from a single specimen found by Mr. W. N. Lockington in the San Francisco market. A few others have since been obtained from sweep nets in deep water.

In its relations it is intermediate between the species which we have taken to be *Brachyistius frenatus* Gill and the common *Cymatogaster aggregatus*. The frenum of the lower lip is too little developed in the large-scaled Embiotocoids (*Abeona*, *Cymatogaster*, "*Brachyistius*") to be used for generic distinction. *Abeona* is well set off by the tricuspid teeth, but the dentition of *Cymatogaster* and *Brachyistius* is essentially the same, the slightly more incisor-like form of the teeth in *Brachyistius* being scarcely definable as a generic character.

The numbers of fin rays do not afford very good generic characters, as will be seen by the following enumeration:

	Dorsal.	Anal.
<i>Cymatogaster aggregatus</i> .....	IX, 20-21	III, 22-24
<i>Brachyistius rosaceus</i> .....	X, 18	III, 20
<i>Brachyistius frenatus</i> .....	VIII, 15	III, 22
<i>Abeona aurora</i> .....	VIII, 17	III, 20
<i>Abeona minima</i> .....	IX, 14	III, 16

We therefore provisionally refer the present species, with *Brachyistius frenatus*, to the genus *Cymatogaster*.

*Table of measurements.*

Extreme length .....	5.92 inches	
Length to base of caudal .....	4.70 inches =	100
Body:		
Greatest depth .....		40
Least depth of tail .....		11½
Length of caudal peduncle .....		15
Head:		
Greatest length .....		30
Width of interorbital area .....		8
Length of snout .....		6½
Length of maxillary .....		8½
Diameter of eye .....		10½
Dorsal:		
Length of base .....		50
Height of highest spine .....		15
Height of longest ray .....		15

## Anal:

Length of base .....	21
Height of longest ray .....	9
Distance from ventrals .....	25

## Caudal:

Length of middle rays .....	13
Length of outer rays .....	26

Pectoral, length .....

27½

Ventral, length .....

23

Dorsal rays .....

X, 18

Anal rays .....

III, 20

Scales .....

6-50-16

SAN FRANCISCO, CAL., March 2, 1880.

**DESCRIPTION OF A NEW SPECIES OF DEEP-WATER FISH (ICHTHYS LOCKINGTONI), FROM THE COAST OF CALIFORNIA.**

**By DAVID S. JORDAN and CHARLES H. GILBERT.**

*Icichthys* gen. nov.

Allied to *Icosteus* Lockington, but the body lower and more elongate, not compressed at the bases of the vertical fins. Head moderate; eyes lateral; mouth terminal, little oblique, with small, sharp teeth in one series, in the jaws only. Gill-openings very wide, continuous. Gill-rakers long. Pseudobranchiæ present. Branchiostegals 7. *Body entirely scaly*. Lateral line continuous, *unarmed*. Bases of fins without spinules.

Dorsal and anal fins long and low, composed of soft rays only. Pectoral fins moderate. Ventral fins small, thoracic, 1, 5. Pyloric coeca about 6, large. Bones all very flexible, cartilaginous.

The scaly body fully distinguishes this species from *Icosteus*, with which singular regards its affinities are intimate, although the known species do not resemble each other closely.

(Etymology: *έιζωω*, to yield or submit; *ιζθης*, fish—in allusion to the flexible skeleton.)

*Icichthys lockingtoni* sp. nov.

Body oblong, moderately elongate, somewhat compressed, the caudal peduncle rather slender.

Head moderate, compressed, with vertical cheeks, rather broad and slightly convex above, the snout abruptly descending, hence bluntish in profile. Profile nearly straight from upper part of snout to the nape.

Mouth moderate, little oblique, the slender maxillary scarcely widened at the tip, extending to rather below the front of the pupil, the anterior edge of the premaxillary on the level of the lower rim of the eye. Lips thin. Upper lip not protractile. Premaxillary tapering backward, not forming the whole margin of the upper jaw. Maxillary behind slipping entirely under the membranous edge of the preorbital. Preorbital rather

wide, with one or two series of rather large, thin cycloid scales. These scales perhaps covered the cheeks also in life. At present no other scales are present on the head in the typical example. Lower jaw prominent, projecting in front, but included at the sides. Teeth in jaws only, minute, sharp, closely and evenly set, much as in *Icosteus enigmaticus*, but rather larger and less numerous.

Eyes large, lateral, longer than snout, their diameter contained about 4 times in the length of the head. Cheeks rather wide. Preopercle with a prominent crest, behind which are some radiating mucous cavities; the bone with a broad, prolonged, flexible membranaceous edge, covered with radiating striae, each of which ends in a slightly exserted flexible point. Opercle and subopercle rather large, extremely thin, and each crossed by numerous conspicuous radiating striae.

Gill-openings wide, not separated by an isthmus, the membranes not connected. Pseudobranchiae present. Branchiostegals 7. Gill-rakers long, slender, sharp, their length nearly three-fourths the diameter of the eye. They are rather close-set and moderately stiff. Gills 4, a slight slit behind the posterior gill.

No bony stay connecting suborbital and preopercle.

Scales very small, apparently cycloid, soft and smooth to the touch, covering the body evenly, but becoming smaller below. Lateral line nearly straight, apparently continuous, but not conspicuous on the middle part of the body. It does not run up on the caudal fin. There are on it no traces of the spinules, so conspicuous in *Icosteus enigmaticus*.

Scales (too small to be accurately counted) in about 120 transverse series.

Dorsal fin long and low, beginning opposite a point nearly midway between the vent and the base of the ventrals; the number of rays 39 to 40. All the rays are soft and articulated, and apparently all except the first are branched. The first rays are very low, the fin gradually rising posteriorly, the highest about one-third the length of the head. The base of the fin is somewhat sealy.

Anal fin entirely similar, but shorter, beginning slightly in front of the middle of the body (without caudal), and ending just in front of the last rays of the dorsal; its rays about 28.

Caudal broad, fan-shaped, on a slender peduncle; the accessory rays numerous and recurrent. The fin is broken, so that its outline cannot be ascertained.

Pectorals as in *Icosteus*, with the carpal bones slightly exserted, as if pedunculate, the base a little below the axis of the body, the outline rounded. The fin is short and small, its length less than that of the head.

Ventrals short and small, thoracic, placed a little behind pectorals, with one obsolete spine and five soft rays, one of which is slightly filamentous. The fin is about one-third the length of the head.

Fin rays not beset with spinules.

Vent normal, immediately in front of the anal, without papilla.

Air-bladder apparently wanting. Pyloric cœca about 6, rather long.

Bones all soft and flexible, as in *Icosteus enigmaticus*. The skin, however, not thick and tough, as in the latter species, but thin and scaled.

Coloration in spirits plain brown, lighter below; the skin somewhat punctulate.

*Measurements of typical example.*

Total length.....	7.5 inches
Length to base of caudal.....	6.8 inches = 100
Greatest depth.....	25
Least depth.....	9
Length of head.....	20
Diameter of eye.....	5½
Interorbital width.....	5½
Distance from snout to dorsal.....	37
Length of base of dorsal.....	51
Height of dorsal.....	7
Distance from snout to anal.....	50
Base of anal.....	32
Length of pectoral.....	11
Length of ventral.....	8
Number of fin rays:	
Dorsal.....	39
Anal.....	28
Scales in lateral line.....	(ca) 120

The single example of this species at present known was obtained in the market of San Francisco by Mr. W. G. W. Harford, with two of the original types of *Icosteus enigmaticus*. It has been presented by the California Academy of Sciences, for whom it was originally obtained, to the United States National Museum. Its specific distinctness from *Icosteus enigmaticus* was first noticed by Mr. Lockington, and we have seen fit to name the species for him, in recognition of his important work in Californian ichthyology.

The two species are called "deep-water fish" by the dealers.

As before noticed, the relations of this genus are evidently with the associated genus *Icosteus*, but the two genera bear little resemblance to any form known to us. They will probably constitute a distinct family or subfamily, in the Trachinoid group.

This family (*Icosteidae*) may be defined as follows:

Body oblong, compressed. Head moderate, unarmed; the suborbital without bony stay. Mouth terminal, little oblique; the premaxillary not protractile; the maxillary slender. Teeth minute, sharp, erect, in one series on the jaws only. No barbels. Gills 4, a slit behind the fourth. Gill-openings wide; the membranes free from the isthmus. Gill-rakers slender. Branchiostegals 7.

Dorsal and anal fins long, without spines. Caudal fin, with many recurrent accessory rays, on a slender peduncle. Pectoral fins rounded, with the carpal bones slightly exerted. Ventral fins thoracic, 1, 5, or 1, 4. Vent normal, without anal papilla. Pseudobranchiae present.



Skeleton imperfectly ossified, the bones flexible, so that the whole body is limp and destitute of firmness.

The two genera may be thus compared:

- Head and body naked, covered with rather thick tough skin; lateral line and fin rays beset with spinules. Dorsal and anal rather high, the body at their bases closely compressed. Dorsal rays, 50 to 55; anal rays, 35 to 40; ventrals rather long, I, 4 ..... ICOSTEUS.
- \* Head partly and the body wholly covered with small scales. Lateral line and fin rays smooth. Dorsal and anal fins low, their bases little compressed. Dorsal rays, 35 to 40; anal rays, 25 to 30; ventrals short, I, 5 ..... ICICHTHYS.

SAN FRANCISCO, CAL., *March 12, 1880.*

# CATALOGUE OF TROCHILIDÆ IN THE COLLECTION OF THE UNITED STATES NATIONAL MUSEUM.

By ROBERT RIDGWAY.

The following catalogue enumerates all the species of Humming Birds which are contained in the collection of the National Museum, with the localities represented, the latter being in many cases additional to those given in standard text-books relating to this family of birds. The chief aim of the list is to show what species are wanted to complete the collection, and exchanges to this end are respectfully solicited. Many of the species of the list are represented by an incomplete series of specimens, often by a single skin only, and of these additional specimens are desirable, especially if from a locality not mentioned in the list. Such species are indicated by an asterisk prefixed to the name.

The names<sup>1</sup> and numbers correspond with those of Elliot's "List of Described Species of Humming Birds," published by the Smithsonian Institution.<sup>2</sup>

\* 1. *Eutoxeres aquila* (Bourc.) Reich.  
Veragua.

4. *Rhamphodon nævius* (Dumont) Reich.  
Brazil.

6. *Glaucis hirsuta* (Gmel.) Boie.

Costa Rica; Trinidad; Grenada, W. I.; E. Peru (Pebas); Panama;  
"Brazil".

10. *Glaucis cervinicauda* (Gould) Salv. & Elliot.  
E. Ecuador (Rio Napo); Brazil?

11. *Glaucis ruckeri* (Bourc.) Gould.  
Panama; Costa Rica.<sup>3</sup>

<sup>1</sup>A few names are here changed in consequence of recent emendations.

<sup>2</sup>List of Described Species of Humming Birds. By Daniel Girard Elliot. Reprinted from a Synopsis of the Trochilidae in the Smithsonian Contributions to Knowledge. Washington: Smithsonian Institution, 1879. (Smithsonian Miscellaneous Collections, No. 334.)

<sup>3</sup>Including the type of *G. inca* Lawr.

- \* 13. *Phæoptila sordida* Gould.  
S. Mexico (Oaxaca).
- \* 16. *Phæthornis yaruqui* (Bourc.) Gould.  
Ecuador.
- 18. *Phæthornis emiliæ* (Bourc.) Bonap.  
Costa Rica; Colombia.
- \* 19. *Phæthornis augusti* (Bourc.) Bonap.  
Venezuela.
- \* 20. *Phæthornis pretrii* Less.  
Brazil.
- \* 21. *Phæthornis superciliosus* (Linn.) Swains.  
Bahia.
- 22. *Phæthornis longirostris* (Less.) Caban. & Hein.  
Mexico; Guatemala; Colombia (Turbo);<sup>1</sup> Panama; E. Peru (Pebas);<sup>2</sup>  
Chiriqui.
- \* 23. *Phæthornis hispidus* (Gould) Gray.  
E. Ecuador (Rio Napo).
- \* 24. *Phæthornis syrmatorphorus* Gould.  
Quito.
- \* 25. *Phæthornis anthophilus* (Bourc.) Gray & Mitch.  
"Bogota".
- \* 26. *Phæthornis eurynome* (Less.) Gray.  
Brazil.
- \* 27. *Phæthornis squalidus* (Temm.) Bonap.  
Southern Brazil; Rio Negro.
- \* 28. *Phæthornis longuemareus* (Less.) Gray.  
Trinidad; "Brazil".
- 29. *Phæthornis adolphi* Gould.  
Guatemala; Costa Rica; Panama; New Grenada (Turbo).
- \* 30. *Phæthornis griseigularis* Gould.  
Colombia.
- \* 31. *Phæthornis striigularis* Gould.  
Colombia.
- 36. *Eupetomena macroura* (Gmel.) Bonap.  
Brazil (Bahia).
- \* 37. *Eupetomena hirundo* Gould.  
Bolivia.
- 38. *Sphenoproctus pampa* (Less.) Gould.  
Guatemala.
- \* 39. *Sphenoproctus curvipennis* (Licht.) Gould.  
E. Mexico (Mirador).

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<sup>1</sup> Types of *P. cassini* Lawr.

<sup>2</sup> A specimen (No. 55374) from Pebas, labeled in Mr. Lawrence's handwriting "*P. moorei* Lawr." is not distinguishable from northern specimens of *P. longirostris*. It does not, however, agree with Mr. Lawrence's description of *P. moorei*, so that Mr. Elliot may be right in referring the latter to *P. superciliosus*.

- \* 40. *Campylopterus largipennis* (Bodd.) Cab. & Hein.  
Cayenne.
- \* 42. *Campylopterus rufus* Less.  
Guatemala (Dueñas; Guatemala City).
- \* 41. *Campylopterus obscurus* Gould.  
E. Peru (Pebas).
- 44. *Campylopterus lazulus* (Bonnatt.) Bonap.  
Colombia; W. Peru.
- 45. *Campylopterus hemileucurus* (Licht.) Cab. & Hein.  
E. Mexico (Jalapa); Honduras; Veragua; Guatemala; Costa Rica.
- \* 46. *Campylopterus ensipennis* (Swains.) Less.  
Tobago.
- \* 47. *Campylopterus villavicencio* (Bonre.) Gould.  
Rio Napo.
- \* 50. *Campylopterus roberti* (Salvin) Gould.  
Guatemala (Choctum, Vera Paz).
- \* 52. *Aphantochroa cirrochloris* (Vieill.) Gould.  
Brazil.
- 54. *Cæligena clemenciæ* Less.  
E. Mexico (Mirador).
- \* 55. *Cæligena henrici* (Less.) Cab. & Hein.  
Guatemala.
- 56. *Cæligena viridipallens* Bonre. & Muls.  
Guatemala (Coban, Vera Paz; Guatemala City); "Mexico".
- \* 57. *Cæligena hemileuca* (Salvin) Elliot.  
Costa Rica.
- 58. *Lamprolæma rhami* (Less.) Reich.  
E. Mexico (Orizaba and Mirador); Guatemala (Guatemala City).
- 59. *Oreopyra calolæma* Salvin.  
Costa Rica.
- \* 60. *Oreopyra leucaspis* Gould.  
Chiriqui.
- 62. *Oreotrochilus pichincha* (Boure. & Muls.) Bp.  
Pichincha.
- \* 63. *Oreotrochilus chimborazo* (Delattr.) Gould.  
Chimborazo.
- \* 64. *Oreotrochilus estellæ* (D'Orb. & Lafr.) Gould.  
Bolivia (La Paz).
- \* 65. *Oreotrochilus leucopleurus* Gould.  
Chili (Valle del Yero).
- 68. *Lampornis violicauda* (Bodd.) Elliot.  
"Florida";<sup>1</sup> Brazil (Bahia); Guiana; Venezuela; Panama; Colombia  
(Bogota and Cartagena); E. Peru (Pebas); Trinidad; Demerara.

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<sup>1</sup>Types of Audubon's works

69. *Lampornis mango* (Linn.) Gosse.  
Jamaica.
70. *Lampornis prevosti* (Less.) Gould.  
Mexico (Tehuantepec).
71. *Lampornis viridis* (Aud. & Vieill.) Gould.  
Porto Rico.
- \* 73. *Lampornis gramineus* (Gmel.) Gould.  
Guiana.
75. *Lampornis dominicus* (Linn.) Elliot.  
St. Thomas; Haiti; Porto Rico.
76. *Eulampis holosericeus* (Linn.) Gould.  
St. Thomas; Martinique; Dominica; Antigua; Guadeloupe; St. Vincent; Grenada; Barbuda; Tobago; St. Bartholomew, and Barbados.
77. *Eulampis jugularis* (Linn.) Gould.  
Martinique; Dominica; Guadeloupe, and St. Vincent.
78. *Lafresnaya flavicaudata* (Fraser) Bonap.  
Colombia (Bogota and Popayan).
- \* 79. *Lafresnaya gayi* (Bonre. & Muls.) Bp.  
Ecuador (Quito).
80. *Chalybura buffoni* (Less.) Reich.  
Venezuela (Laguayra); Colombia; Panama.
- \* 82. *Chalybura isauræ* (Gould) Salv.  
Veragua; Costa Rica.
83. *Chalybura melanorrhœa* Salvin.  
Costa Rica.
- \* 84. *Chalybura cæruleiventris* (Reich.) Cab. & Hein.  
Colombia (Bogota).
85. *Florisuga mellivora* (Linn.) Bonap.  
Guatemala; Bogota; E. Peru; Tobago; Guiana (Demerara); Ecuador (Quito); Tres Marias, W. Mexico! [?]
86. *Florisuga fusca* (Vieill.) Reich.  
Brazil (Bahia).
- \* 87. *Petasophora anais* (Less.) Gould.  
Colombia; Ecuador (Quito and Puna L.); Bolivia (La Paz).
88. *Petasophora thalassina* (Swains.) Gould.  
Mexico (Jalapa and Tres Marias); Guatemala (V. de Fuego, 5,000 ft., and Guatemala City).
89. *Petasophora cyanotis* (Bonre.) Gould.  
Costa Rica; Veragua; Colombia.
- \* 92. *Petasophora serrirostris* (Vieill.) Bonap.  
Brazil.
93. *Petasophora delphinæ* (Less.) Bonap.  
Trinidad; Colombia; Guatemala (Cobau, Vera Paz).
- \* 94. *Panoplites jardini* (Bonre.) Gould.  
Ecuador (Quito).

95. *Panoplites flavescens* (Lodd.) Gould.  
Colombia (Bogota).
96. *Panoplites matthewsi* (Boure.) Gould.  
E. Ecuador (Rio Napo); E. Peru (Pebas).
97. *Phæolæma rubinoides* (Boure.) Reich.  
Colombia.
99. *Clytolæma rubinea* (Gmel.) Gould.  
Brazil.
- \* 100. *Clytolæma aurescens* Gould.  
E. Peru (Pebas).
- \* 103. *Iolæma frontalis* (Lawr.) Gould.  
E. Peru (Pebas).
- \*<sup>1</sup> 106. *Eugenes fulgens* (Swains.) Gould.  
Arizona; E. Mexico; Guatemala.
107. *Eugenes spectabilis* (Lawr.) Muls.  
Costa Rica.
- \* 109. *Eugenia imperatrix* Gould.  
Ecuador (Quito).
111. *Heliodoxa jacula* Gould.  
Costa Rica; Veragua; Colombia.
- \* 112. *Heliodoxa jamesoni* (Boure.) Gould.  
Ecuador (Quito); Bogota.
113. *Heliodoxa leadbeateri* (Boure.) Gould.  
Colombia; "Rio".
- \* 114. *Pterophanes temmincki* (Boiss.) Gould.  
Bogota; Quito.
- \* 115. *Patagona gigas* (Vieill.) Gray.  
Quito; Chili; Peru (near Umbamba).
116. *Docimastes ensiferus* (Boiss.) Gould.  
Ecuador (Quito); Bogota.
120. *Helianthea typica* (Less.) Gould.  
Colombia.
121. *Helianthea bonapartii* (Boiss.) Gould.  
Colombia.
- \* 123. *Helianthea lutiæ* (Delattr. & Bourc.) Gould.  
Colombia (Popayan); Quito.
- \* 130. *Bourcieria fulgidigula* Gould.  
Ecuador (Quito).
131. *Bourcieria torquata* (Boiss.) Gould.  
Colombia (Bogota).
- \* 133. *Bourcieria wilsoni* (Delattr. & Bourc.) Bp.  
Ecuador (Quito).
- \* 136. *Bourcieria prunelli* (Boure. & Muls.) Bp.  
Colombia (Bogota).



- \* 137. *Bourcieria cæligena* (Less.) Elliot.  
Bogota (?).
- \* 138. *Bourcieria columbiana* Elliot.  
Colombia (Bogota).
- \* 140. *Hemistephania johannæ* (Boure.) Reich.  
Colombia (Bogota).
- \* 141. *Hemistephania ludovicicæ* (Boure. & Muls.) Reich.  
Colombia (Bogota).
- \* 142. *Hemistephania rectirostris* (Gould) Elliot.  
Ecuador.
- \* 144. *Hemistephania veraguensis* (Salv.) Elliot.  
Costa Rica.
- 145. *Floricola longirostris* (Vieill.) Elliot.  
Mexico (Chiapas); Guatemala (Dueñas); Costa Rica; Panama; Trinidad.
- 147. *Floricola constanti* (Delattr.) Elliot.  
Costa Rica; Guatemala; San Salvador; Chiapas; Mazatlan.
- \* 148. *Floricola leocadiæ* (Boure.) Elliot.  
Mexico (Tehuantepec, Acapulco, and Mazatlan).
- \* 149. *Lepidolarynx mesoleucus* (Temm.) Reich.  
Brazil.
- 150. *Heliomaster furcifer* (Shaw) Elliot.  
Brazil; Buenos Ayres (Conchitas).
- 152. *Heliotrypha exortis* (Fras.) Elliot.  
Colombia (Bogota).
- 155. *Heliangelus clarissæ* (De Long.) Bp.  
Colombia (Bogota).
- \* 156. *Heliangelus strophianus* (Gould) Bp.  
Ecuador (Quito).
- \* 161. *Urosticte benjamini* (Boure.) Gould.  
Ecuador (Quito and Nanegal).
- 162. *Eustephanus galeritus* (Mol.) Reich.  
Chili (Santiago).
- \* 165. *Topaza pella* (Linn.) Gray.  
Cayenne; Demerara.
- 167. *Aithurus polytmus* (Linn.) Csb. & Hein.  
Jamaica.
- 169. *Thalurania glaucopis* (Gmel.) Gould.  
Brazil (Rio and Bahia); "Tres Marias Islands"<sup>1</sup> [???].
- 170. *Thalurania columbica* (Boure. & Muls.) Gould.  
Costa Rica; Veragua; Panama; Colombia.
- \* 171. *Thalurania furcata* (Gmel.) Gould.  
Guiana (Demerara); Trinidad.
- \* 173. *Thalurania nigrofasciata* (Gould) Bp.  
Ecuador (Quito); E. Peru (head Huallaga R.); Upper Amazons?

<sup>1</sup> Type of *T. lucicæ* Lawr.

- \* 177. *Thalurania eriphile* (Less.) Bp.  
Brazil (Rio Grande do Sul); Ecuador (Quito).
- \* 179. *Thalurania bicolor* (Gmel.) Elliot.  
Dominica.
180. *Mellisuga minima* (Linn.) Bp.  
Jamaica; St. Domingo; Haiti (Pt. au Prince).
- \* 182. *Microchera parvirostris* Lawr.  
Costa Rica (Angostura).
183. *Trochilus colubris* Linn.  
Eastern North America (numerous localities); Mexico; Guatemala;  
Costa Rica; Veragua.
184. *Trochilus alexandri* Bourc. & Muls.  
California; Nevada; Utah; New Mexico; Arizona.
- \* 185. *Calypte costæ* (Bourc.) Gould.  
Guatemala; W. Mexico (Mazatlan); S. California (Ft. Tejon); Cape  
St. Lucas; Arizona.
186. *Calypte annæ* (Less.) Gould.  
California; Arizona.
- \* 187. *Calypte helenæ* (Lemb.) Gould.  
Cuba.
189. *Selasphorus platycercus* (Swains.) Bp.  
Guatemala; Mexico (Mirador); Arizona; New Mexico; Colorado;  
Utah; E. Nevada; Wyoming (Ft. Bridger).
- \* 190. *Selasphorus ardens* Salvin.  
Costa Rica.
192. *Selasphorus alleni* Henshaw.<sup>1</sup>  
California (coast-region, Santa Cruz to Nicasio).
194. *Selasphorus rufus* (Gmel.) Aud.<sup>2</sup>  
Columbia R., Oregon (3 specimens, types of Audubon's works!);  
Sitka, Alaska; Ft. Steilacoom, Washington Terr.; Dakota; Nevada;  
California; Colorado; Idaho; Arizona; New Mexico; Texas (El Paso);  
table-lands of Mexico, south to Mirador.
193. *Selasphorus scintilla* Gould.  
Costa Rica; Veragua.
- \* 197. *Atthis heloisæ* (Less.) Reich.  
E. Mexico.
- \* 198. *Atthis ellioti* Ridgw.  
Guatemala.
199. *Stellula calliope* Gould.  
New Mexico; Arizona; California (Ft. Tejon, Ft. Crook, Honey Lake,  
&c.); Nevada; Montana (Ft. Ellis).
- \* 202. *Heliactin cornuta* (Max.) Boic.  
Brazil.
- \* 204. *Calothorax lucifer* (Swains.) Gray.  
E. Mexico (Mirador); Arizona.

<sup>1</sup>*S. rufus* of Elliot's list.<sup>2</sup>*S. henshawi* of Elliot's list.

- \*205. *Acestrura mulsanti* (Boure.) Gould.  
Ecuador (Quito).
- \*207. *Acestrura heliodori* (Boure.) Gould.  
Colombia (Bogota).
- 213. *Doricha enicura* (Vieill.) Reich.  
Guatemala (Coban and Guatemala City).
- 214. *Doricha elizæ* (Less. & Delattr.) Gould.  
Jalapa; Mirador; Merida; Yucatan.
- \*215. *Doricha bryantæ* Lawr.  
Costa Rica; Veragua?
- \*216. *Doricha evelynæ* (Boure.) Gould.  
Bahamas (Nassau, New Providence).
- 217. *Doricha lyrura* Gould.  
Bahamas (Inagua).
- \*218. *Myrtis fanny* (Less.) Reich.  
Ecuador (Quito).
- 220. *Tilmatura duponti* (Less.) Cab. & Hein.  
Guatemala.
- 223. *Calliphlox amethystina* (Gmel.) Reich.  
Trinidad; Brazil.
- \*225. *Lophornis stictolophus* Saly. & Elliot.  
Colombia (Bogota).
- \*226. *Lophornis delatirii* (Less.) Gould.  
Panama; Veragua?
- \*228. *Lophornis ornatus* (Bodd.) Gould.  
"Brazil"; Trinidad.
- \*230. *Lophornis magnificus* (Vieill.) Gould.  
Brazil.
- 231. *Lophornis helenæ* (Delattr.) Reich.  
"Mexico"; Guatemala.
- \*233. *Lophornis verreauxi* (Boure.) Reich.  
E. Peru (Pebas).
- \*234. *Lophornis chalybea* (Vieill.) Bp.  
Brazil.
- \*235. *Popelaria<sup>1</sup> tricholopha* Reich.  
Colombia.
- \*236. *Popelaria langsdorffi* (Boure. & Vieill.) Ridgw.  
Brazil; E. Peru (Pebas).
- \*237. *Popelaria conversi* (Boure. & Muls.) Ridgw.  
Costa Rica.
- 240. *Steganura underwoodi* (Less.) Reich.  
Colombia (Bogota).
- \*241. *Steganura melananthra* (Jard.) Reich.  
Ecuador (Quito).
- 247. *Lesbia gouldi* (Lodd.) Reich.  
Colombia (Bogota).

<sup>1</sup> Name *Souldia* preoccupied in Conchology (C. B. ADAMS, Cat. Gen. & Sp. recent Shells, Jan. 1847, p. 29; cf. DALL, P. Z. S. 1879, pp. 131, 132).

250. *Lesbia amaryllis* (Boure.) Reich.  
Colombia (Bogota); Ecuador (Quito).
253. *Cynanthus forficatus* (Linn.) Bp.  
Bogota; Quito.
- \* 259. *Oxypogon guerini* (Boiss.) Gould.  
Colombia.
- \* 261. *Rhamphomicron olivaceus* Lawr.  
Bolivia (La Paz).
262. *Rhamphomicron heteropogon* (Boiss.) Bp.  
Colombia (Bogota).
- \* 263. *Rhamphomicron herrani* (Delattr. & Bourc.) Gould.  
Ecuador (Quito).
- \* 264. *Rhamphomicron stanleyi* (Bourc. & Muls.) Gould.  
Bolivia (La Paz).
266. *Rhamphomicron microhynchum* (Boiss.) Bp.  
Bogota; Quito.
- \* 268. *Avocettula recurvirostris* Swains.  
Guiana.
276. *Metallura tyrianthina* (Lodd.) Bp.  
Bogota; Quito.
- \* 278. *Chrysuronia humboldti* (Bourc. & Muls.) Reich.  
Buenaventura, Ist. Panama.<sup>1</sup>
- \* 279. *Chrysuronia ænone* (Less.) Bp.  
Colombia.
- \* 280. *Chrysuronia josephinæ* (Bourc. & Muls.) Reich.  
E. Peru (Pebas).
- \* 281. *Chrysuronia eliciæ* (Bourc. & Muls.) Bp.  
Guatemala (Masagua, Pacific coast).
282. *Chrysuronia chrysura* (Less.) Bp.  
Brazil; Argentine Republic (Conchitas).
- \* 287. *Schistes geoffroyi* (Bourc. & Muls.) Gould.  
Bogota.
288. *Heliothrix auritus* (Gmel.) Boie.  
Brazil; Colombia (Bogota).
- \* 289. *Heliothrix auriculatus* (Licht.) Gray.  
Brazil.
290. *Heliothrix barroti* (Bourc.) Gray.  
Guatemala; Costa Rica; Veragua; Panama.
291. *Chrysolampis moschitus* (Linn.) Boie.  
Tobago; Trinidad; Brazil (Rio Janeiro and Bahia); Colombia (Bogota and Cartagena).
292. *Bellona cristata* (Linn.) Muls.  
Grenada; St. Vincent; Barbadoes; "Venezuela".<sup>2</sup>
- [292a.] *Bellona ornata* (Gould) Ridgw.  
St. Vincent.

<sup>1</sup>Type of *Thaumatias viridicaudus* Lawr.<sup>2</sup>Type of *Orthorhynchus emigrans* Lawr.

293. *Bellona exilis* (Gm.) Muls.

Dominica: St. Thomas; Martinique; Antigua; Guadeloupe; Barbuda; Porto Rico: St. Bartholomew.

\* 294. *Cephalolepis delalandi* (Vicill.) Lodd.

Brazil (Rio Grande do Sul).

\* 295. *Cephalolepis loddigesi* (Gould) Bp.

Brazil.

299. *Adelomyia melanogenys* (Fras.) Gould.

Bogota; Quito.

301. *Abeillia typica* Bonap.

Guatemala.

302. *Klais guimeti* (Boure. & Muls.) Reich.

Costa Rica; Veragua; Colombia.

303. *Aglæactis cupripennis* (Boure. & Muls.) Bp.

Colombia; Ecuador (Quito).

\* 304. *Aglæactis caumatonota* (Gould) Bp.

Peru (Matara, prov. Ayacucho).<sup>1</sup>

\* 307. *Eriocnemis derbiana* (Delattr. & Bourc.) Bp.

Ecuador (Quito).

309. *Eriocnemis aureliæ* (Boure. & Muls.) Reich.

Colombia (Bogota).

\* 311. *Eriocnemis lugens* Gould.

Ecuador (Quito).

\* 312. *Eriocnemis alinæ* (Boure.) Reich.

Colombia.

\* 315. *Eriocnemis luciani* (Boure.) Reich.

Ecuador (Quito).

316. *Eriocnemis cupreiventris* (Fras.) Reich.

Colombia (Bogota).

320. *Eriocnemis vestita* (Longnem.) Reich.

Colombia (Bogota).

\* 324. *Panterpe insignis* Cab. & Hein.

Costa Rica.

\* 325. *Uranomitra quadricolor* (Vicill.) Reich.

Orizaba; Mazatlan.

\* 326. *Uranomitra violiceps* (Gould) Cab. & Hein.

Mexico (Orizaba and Mazatlan).

327. *Uranomitra viridifrons* Elliot.

S. Mexico (Tehuantepec).

328. *Uranomitra cyanocephala* (Less.) Reich.

Mexico (Mirador, Tehuantepec, Chiapas, Tres Marias); Guatemala (Vera Paz).

330. *Uranomitra franciæ* (Boure.) Reich.

Colombia (Bogota).

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<sup>1</sup>Type of *A. olivaceocauda* LAWY.



- \* 332. *Leucippus chionogaster* (Tschudi) Gould.  
Bolivia (La Paz).
- \* 333. *Leucippus chlorocercus* Gould.  
E. Peru (Pebas).
- 334. *Leucochloris albicollis* Vieill.  
Brazil.
- \* 335. *Agyrtria niveipectus* Cab. & Hein.  
Trinidad.
- \* 336. *Agyrtria leucogaster* (Gmel.) Reich.  
Brazil (Bahia).
- \* 338. *Agyrtria milleri* (Bourc.) Reich.  
Colombia.
- 339. *Agyrtria candida* (Bourc. & Muls.) Cab. & Hein.  
S. Mexico (Tehuantepec); Guatemala.
- 341. *Agyrtria brevirostris* (Less.) Reich.  
Brazil (Rio Grande do Sul).
- \* 347. *Agyrtria tephrocephala* (Vieill.) Elliot.  
Brazil; Surinam.
- \* 349. *Agyrtria fluviatilis* (Gould) Hein.  
E. Ecuador (Rio Napo).
- \* 356. *Elvira cupreiceps* (Lawr.) Muls.  
Costa Rica.
- \* 357. *Elvira chionura* (Gould) Muls.  
Costa Rica (Dota).
- \* 358. *Callipharus nigriventris* (Lawr.) Elliot.  
Costa Rica.
- \* 360. *Eupherusa eximia* (Delattr.) Gould.  
Guatemala.
- \* 361. *Eupherusa egregia* Sel. & Salv.  
Costa Rica.
- 362. *Polytmus thaumantias* (Linn.) Cab. & Hein.  
Trinidad; Venezuela; Bogota!
- \* 363. *Polytmus viridissimus* (Vieill.) Elliot.  
Guiana; Surinam?
- \* 368. *Amazilia dumerili* (Less.) Bp.  
Ecuador (Puna L., Guayaquil).
- 369. *Amazilia cinnamomea* (Less.) Elliot.  
Yucatan; Nicaragua; Tehuantepec; Mazatlan; San Salvador.
- \* 370. *Amazilia graysoni* Lawr.  
W. Mexico (Tres Marias Islands).
- \* 371. *Amazilia yucatanenses* (Cabot) Gould.  
Mexico (Jalapa); S. Texas (Ft. Brown).
- 372. *Amazilia fuscicaudata* (Fras.) Ridgw.  
S. Mexico (Cordova and Tehuantepec); S. Texas (Ft. Brown); Guatemala; Nicaragua; Costa Rica; Colombia; Ecuador (Guayaquil).

- \* 373. *Amazilia viridiventris* (Reich.) Elliot.  
Colombia (Bogota).
- 375. *Amazilia beryllina* (Licht.) Gould.  
Mexico (Jalapa); Guatemala.
- \* 376. *Amazilia edwardi* (Del. & Bourc.) Bp.  
Panama.
- \* 377. *Amazilia niveiventris* (Gould) Elliot.  
Costa Rica.
- \* 378. *Amazilia mariæ* (Bourc.) Elliot.  
Guatemala.
- \* 379. *Amazilia cyanura* Gould.  
Guatemala (Pacific side); Realejo.
- 382. *Amazilia erythronota* (Less.) Elliot.  
Tobago; Trinidad.
- 384. *Amazilia sophiæ* (Bourc. & Muls.) Bp.  
Costa Rica; Nicaragua.
- 387. *Amazilia cyanifrons* (Bourc.) Elliot.  
Colombia (Bogota).
- \* 389. *Basilinna leucotis* (Vieill.) Boie.  
Mexico (Jalapa, Mirador, and Mazatlan); Guatemala (Chilasco, Vera Paz).
- \* 390. *Basilinna xantusi* (Lawr.) Elliot.  
Cape St. Lucas.
- 391. *Eucephala grayi* (Del. & Bourc.) Reich.  
Ecuador (Quito).
- 397. *Eucephala cærulea* (Vieill.) Gould.  
Trinidad; Guiana; Demerara; Bahia.
- \* 401. *Juliamyia typica* Bonap.  
Panama; Bogota; Turbo.
- \* 402. *Juliamyia feliciani* (Less.) Gould.  
Ecuador (Guayaquil); Bogota!
- 403. *Damophila amabilis* (Gould) Reich.  
Costa Rica; Panama; Bogota; Turbo.
- \* 404. *Iache latirostris* (Swains.) Elliot.  
W. Mexico (Colima, Mazatlan, and Tres Marias); Arizona.
- \* 406. *Iache doubledayi* (Bourc.) Elliot.  
Tehuantepec (Chiluitan).
- 408. *Hylocharis sapphiria* (Gm.) Gray.  
Brazil (Bahia and Rio Grande do Sul); Demerara.
- 409. *Hylocharis cyanea* (Vieill.) Gray.  
Brazil (Bahia and Rio Grande do Sul); Surinam.
- 410. *Cyanophaia cæruleigularis* (Gould) Elliot.  
Panama; Cartagena; "Centr. Am."
- 411. *Cyanophaia goudoti* (Bourc.) Elliot.  
Colombia (Bogota).

- \* 412. *Cyanophaia luminosa* (Lawr.) Elliot.  
Colombia (Cartagena).
- \* 414. *Sporadinus elegans* (Vieill.) Bp.  
St. Domingo.
415. *Sporadinus ricordi* (Gerv.) Bp.  
Cuba.
- \* 416. *Sporadinus maugæi* (Vieill.) Bp.  
Porto Rico.
418. *Chlorostilbon caniveti* (Less.) Bp.  
Mexico (Mirador, Jalapa, and Tehuantepec); Yucatan (Merida); Guatemala; Costa Rica.
419. *Chlorostilbon pucherani* (Bourc. & Muls.) Ell.  
Southeastern Brazil (Rio Grande do Sul); W. Mexico (Tres Marias) [???].<sup>1</sup>
420. *Chlorostilbon splendidus* (Vieill.) Elliot.  
Buenos Ayres (Conchitas); Paraguay (Rio Parana).
421. *Chlorostilbon haberlini* (Reich.) Cab & Hein.  
Colombia (Bogota).
422. *Chlorostilbon angustipennis* (Fras.) Gould.  
Costa Rica (Cartago); Panama; Quito; E. Peru (Pebas).
423. *Chlorostilbon atala* (Less.) Gould.  
Trinidad.
- \* 425. *Panychlora poortmani* Bourc.  
Colombia (Bogota).
- \* 427. *Panychlora stenura* Cab & Hein.  
"New Granada."

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**DESCRIPTION OF A NEW EMBIOTOCOID FISH (*DITREMA ATRIPES*),  
FROM THE COAST OF CALIFORNIA.**

**By DAVID S. JORDAN and CHARLES H. GILBERT.**

Allied to *Ditrema* (*Phanerodon*) *furcatum*. Body unusually elongate, slenderer than in *Ditrema furcatum*, tapering into a long and slender caudal peduncle. Back little elevated. Profile slightly depressed above the eyes, the snout rather projecting.

Head small, triangular in profile, the snout rather acute. Mouth small, oblique, the maxillary not reaching the front of the eye. Pre-maxillary anteriorly rather above the level of the lower edge of the pupil. Lower jaw slightly included in the closed mouth. Teeth smaller and fewer in number than in *D. furcatum*, conical, in one series,  $\frac{8}{6}$  or less in number (about  $\frac{15}{12}$  in *D. furcatum*).

Eye moderate, about as long as snout,  $3\frac{1}{2}$  in length of head. Inter-

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<sup>1</sup>Type of *C. insularis* Lawr.

<sup>2</sup>Females wanted.

orbital space strongly convex transversely. Cheeks with three rows of scales.

Gill-rakers rather small, but longer and stronger than in *D. furcatum*, the longest about one-third the diameter of the orbit.

Scales moderate, averaging rather smaller than in *D. furcatum*, about 5-70-13.

Spinous dorsal comparatively low, the first spine short, the others rapidly increasing to the fifth, after which the others are nearly of equal length, but gradually increasing to the last. The first soft ray is a little higher than the highest spine. The other soft rays are gradually shortened.

The caudal fin is deeply forked, the lobes being about equal. In *D. furcatum* the upper lobe is evidently the longer. Anal fin low, its spines moderately developed. Pectorals not reaching to the tips of the ventrals, which scarcely fall short of the first anal spine.

Fin rays: D. X, 23; A. III, 29.

Coloration light dusky olive above, silvery below, with pearly reflections. Scales above the axis of the body each with a golden-red spot at base, the outer margin of the scales tinged with light blue. These spots fade in alcohol, but are conspicuous in life, forming reddish streaks along the rows of scales.

Membrane of dorsal, anal, and ventral fins light olive-green. Traces of a dark shade on upper part of first rays of soft dorsal. No black at base of dorsal. A distinct black blotch on upper third of first eight-rays of the anal. Ventrals broadly tipped with reddish black, as in *Hyperprorodon argenteus*. Pectorals and caudal entirely plain, the black edging to the latter fin, characteristic of *D. furcatum*, being entirely wanting. Premaxillaries and end of snout distinctly dusky. Iris silvery, reddish above.

In *Ditrema furcatum* the color is nearly plain, pale, olivaceous, and silvery, the scales with bright reflections, but without distinct red markings. The sides are more silvery than in *D. atripes*, and there are more black punctulations. The naked portion of the base of the soft dorsal is black. There is no dark shade on the ventrals, and the caudal is distinctly margined with black behind. The dark anal spot is similar in the two species, but it is sometimes wanting in *D. furcatum*.

The species *Ditrema argyrosoma* (*Phanerodon argyrosomus* Gill, *Embiotoca argyrosoma* Girard), if distinct from *Ditrema furcatum*, is unknown to us. It differs, according to Girard, in having the anal III, 24, but the types had been mutilated and this count may, perhaps, be erroneous.

*Measurements of Ditrema furcatum and Ditrema atripes in 100ths of length to base of caudal fin.*

	Ditrema furcatum.	Ditrema atripes.
	<i>Inches.</i>	<i>Inches.</i>
Extreme length.....	10.3	9.15
Length to base of caudal.....	8.18	7.35
Body:		
Height.....	.39	.38
Least height of tail.....	.12	.113
Length of caudal peduncle from end of anal fin.....	.167	.23
Head:		
Length.....	.263	.285
Width of interorbital area.....	0	.082
Length of snout.....	.07	.078
Length of gill-rakers.....	.01	.018
Length of maxillary.....	.075	.075
Length of mandible.....	.075	.092
Diameter of orbit.....	.075	.072
Dorsal:		
Length of base.....	.512	.48
Length of fifth spine.....	.085	.085
Length of highest spine.....	.09	.010
Length of highest ray.....	.12	.113
Anal:		
Length of base.....	.30	.275
Longest ray.....	.06	.058
Caudal:		
Middle rays.....	.09	.095
Upper lobe.....	.256	.23
Lower lobe.....	.24	.24
Pectorals, length.....	.25	.26
Ventrals, length.....	.155	.176
Dorsal.....	X, 25	X, 24
Anal.....	III, 33	III, 29
Tubes in lateral line.....	70	71
Rows of scales above lateral line.....	5	5
Rows of scales below lateral line.....	13	13

The present species was described from two specimens, similar in size, obtained in the San Francisco market, and probably caught in Monterey Bay. Later, about 200 others were obtained at Monterey and Santa Cruz, but the species has not yet been noticed elsewhere on the coast.

We refer this species for the present to the genus *Ditrema*, of which *Phanerodon* Girard is considered by us a synonym.

We have not seen the Japanese type of the genus, *Ditrema temmincki*, but in external characters at least it agrees with *Phanerodon*.

SAN FRANCISCO, CAL., March 14, 1880.

#### DESCRIPTION OF A NEW SCORPENOID FISH (SEBASTICHTHYS MALIGER), FROM THE COAST OF CALIFORNIA.

By DAVID S. JORDAN and CHARLES H. GILBERT.

Allied to *Sebastichthys nebulosus* and more remotely to *Sebastichthys vexillaris*. Body oblong, moderately robust, the profile with a regular but not very steep slope. Mouth moderate, nearly horizontal, the jaws equal when closed, the upper jaw somewhat emarginate. Maxillary reaching to near the posterior border of the eye; premaxillary in front below the level of the eye. Preorbital moderate, its neck about one-third the width of the large eye, with an angular lobe.



Spinous ridges on the top of the head rather prominent, much as in *nebulosus*, but lower, a little less depressed than in *rexillaris*. The following pairs are present: Nasal, preocular, supraocular, tympanic, and occipital, five in all. The nasal spines are very strong. The preocular and supraocular are broad and sharp. The tympanic spines are smaller than in related species. The occipital ridges are short and comparatively weak, the point rather depressed.

Preopercular spines very short, but all distinct, the upper one broad, the second longest and most acute. Opercular spines large, the upper very long and strong. Bluntish spines on subopercle and interopercle. Two suprascapular spines. Interorbital space rather deeply and somewhat evenly concave, with a rather deep pit anteriorly.

Gill-rakers about 10+20, stout, moderately long, rather longer than in *nebulosus*, somewhat clavate, the longest about equal to the diameter of the pupil.

Scales moderate, rough, in about 55 transverse rows. Accessory scales developed.

Dorsal spines very high and strong, the fourth spine highest, usually more than half the length of the head, the last spines low, so that the fin is deeply emarginated.

The membrane of the spinous dorsal is very deeply incised, more than half the anterior edge of each of the middle spines being above the membrane; even four-fifths of the length of the highest spine is sometimes free anteriorly. This is subject to some variations, but in all cases the bare portion of the spines is much higher than in other species. Soft dorsal high, but lower than spinous dorsal. Caudal truncate.

Anal fin rather low, the spines short. Second anal spine a little higher than the third, not two-thirds the height of the soft rays.

D. XIII, 12; A. III, 7.

Pectoral fins extremely broad and rounded, as in *S. rastrelliger*, the tips reaching beyond the tips of the ventrals, but not to the vent. The base of the fin is greater than the diameter of the eye and about twice the length of the occipital ridge. In both sexes the lower rays are thickened and fleshy.

Prevailing color a warm brownish yellow, sometimes quite yellow on the sides and below, the back sometimes considerably olive, sometimes reddish tinged. Sides of head, front of back, and thoracic region usually most distinctly yellow. The coloration mottled and clouded, but without distinct markings except the small spots with which the anterior region is closely covered. They are smallest and most distinct on the thoracic and scapular region. Here they are of a clear orange-brown color. On the top of the head they become more orange, and on the anterior part of the back they become larger and of a bright clear orange. Posteriorly they blend with the ground color. Top of head with dusky cross-shades. Sclerotic coat of eye spotted above with orange.

Fins all with the membranes slaty black; the pectorals and dorsal

paler at base and spotted with reddish. Membrane of the third dorsal spine scarcely paler than that of the second. There are no other traces of the light areas found in *nebulosus* and *fasciolaris*. There are usually traces of brownish shades radiating from the eye and alternating with yellowish areas.

This species is not rare in the San Francisco markets. The specimens from which the above description was taken, four in number, were obtained in the neighborhood of the Farallones. It is frequently taken in deep water in Monterey Bay and in the Straits of Fuca; it is very abundant, reaching a large size. It is one of the larger species, agreeing in size and appearance with *S. vexillaris*. Its relations are, however, more nearly with *S. nebulosus*, and it forms a transition from the brown to the red series.

*Table of measurements.*

Length to base of caudal .....	= 100
Body:	
Greatest height .....	37.5
Least height of tail .....	11.8
Head:	
Greatest length .....	38.5
Length of occipital ridges .....	6.3
Length of supraocular ridges .....	4.3
Length of preocular ridges .....	2.2
Interorbital width .....	7.9
Length of snout .....	9.2
Length of gill-rakers .....	3.5
Length of maxillary .....	19.5
Diameter of orbit .....	10.5
Dorsal:	
Longest spine .....	23
Longest ray .....	17.5
Least height of membrane between third and fourth spines .....	4.5
Anal:	
Second spine .....	12.3
Third spine .....	12
Longest ray .....	18
Caudal, length .....	17
Pectoral:	
Length .....	25
Width of base .....	11
Ventral, length .....	22
Dorsal .....	XIII, 12
Anal .....	III, 6
Lateral line (rows of scales) .....	47
Extreme length, in inches .....	15.45
Length to base of caudal, in inches .....	13.1

SAN FRANCISCO, CAL., *March* 15, 1880.

NOTE ON A NEW FLAT-FISH (*LEPIDOPSETTA ISOLEPIS*) FOUND IN THE MARKETS OF SAN FRANCISCO.

By W. N. LOCKINGTON.

In the review of the Pleuronectidæ of San Francisco (Proc. U. S. Nat. Mus. 1879, 69-108), a species belonging to the genus *Lepidopsetta* (Gill) is described as identical with the *Platichthys umbrosus* of Girard (Pac. Rail. Rep., x, 149, 1857). At the epoch when this description was written, as well as on previous occasions when a comparison was instituted between this species and the description of Girard above referred to, several discrepancies were noted, yet it was not supposed possible that that author had redescribed one of Dr. Ayres's species when the description of the latter was accessible to him.

Such, however, as first pointed out by Dr. Gill, turns out to be the case, and *Platichthys umbrosus* (Grd.) must sink into a synonym of *Lepidopsetta bilineata* (Ayres), while the form described by me as *L. umbrosa* needs renaming.

The synonymy of the two species will be as follows:

***Lepidopsetta bilineata*.**

*Platessa bilineata* Ayres, Proc. Cal. Acad. Nat. Sci., i, 40.

*Platichthys umbrosus* Grd., Pac. Rail. Rep., x, 1855-57, 149.

*Lepidopsetta bilineata* Gill, Proc. Phil. Acad. Nat. Sci.

*Lepidopsetta umbrosa* Gill, Proc. Phil. Acad. Nat. Sci.

*Lepidopsetta bilineata* Lockn., Proc. U. S. Nat. Mus. 1879, 103.

***Lepidopsetta isolepis* sp. nov.**

*Lepidopsetta umbrosa* Lockn., Proc. U. S. Nat. Mus. 1879, 106.

This species is not closely related to *L. bilineata*. Its ctenoid scales, almost uniform over the head and body, its nearly straight lateral line, its smaller eyes, with a broader, flattish interorbital space, as well as the differences in the form and the number of fin rays, completely distinguish *L. isolepis* from *L. bilineata*.

Typical examples are in the United States National Museum.

## NOTE ON A FORGOTTEN PAPER OF DR. AYRES AND ITS BEARING ON THE NOMENCLATURE OF THE CYPRINOID FISHES OF THE SAN FRANCISCO MARKETS.

By DAVID S. JORDAN.

During the infancy of the California Academy of Sciences the reports of its proceedings were published in the Daily Placer Times and Transcript, a newspaper then issued in San Francisco.

In the files of this paper for 1854 occur descriptions of new species of fishes from the San Francisco markets, by Dr. W. P. Gibbons and Dr. W. O. Ayres. The descriptions of Dr. Gibbons were soon after repub-

lished in the Proceedings of the Academy of Natural Sciences of Philadelphia (1854), and identifications of them have been carefully made by Alexander Agassiz (Proc. Boston Soc. Nat. Hist., 1861, 122). By this means the names given by Dr. Gibbons have taken their proper places in synonymy.

The descriptions published by Dr. Ayres have, on the contrary, not been noticed, so far as I know, by any subsequent author, not even by Dr. Ayres himself, who soon after redescribed the same species as new, apparently not considering the first publication as a sufficient one, as one species at least received a new name on the second description.

The following are the species in question :

1. *Leuciscus gibbosus* Ayres.

Stouter and thicker than any previously described species of the genus. Mouth small. About 60 scales in the lateral line. Brown above; silvery below. Weight about a pound. (Daily Placer Times and Transcript, issue of May 30, 1854.)

This description is not very explicit, but we are to remember that the species was described from the fish market of San Francisco, and that the five species then common in the markets were the subjects of the five descriptions. The following species of Cyprinoid fishes are taken in the Lower Sacramento River, and are now, as then, abundant in the market of San Francisco: *Ptychochilus oregonensis*, *Ptychochilus vorax*, *Siboma crassicauda*, *Pogonichthys inaequilobus*, *Orthodon microlepidotus*, and *Catostomus occidentalis*.

The description of *Leuciscus gibbosus* above quoted, as well as a more elaborate one afterwards published of "*Lavinia gibbosa*," applies to *Siboma crassicauda* only among the fishes which come to the San Francisco market. The name *gibbosus* was published in May, 1854; the name *crassicauda* in August, 1854. We have therefore no alternative but to drop the latter very characteristic name, and call the species *Siboma gibbosa*, or, perhaps better, *Telestes gibbosa*, for the robust caudal peduncle hardly furnishes a sufficient reason for a genus *Siboma*. In Ayres's time, as now, this species was known in the market as the "Chub."

2. *Leuciscus microlepidotus* Ayres (l. c., May 30).

This species, afterwards more fully described as *Gila microlepidota*, is the well-known *Orthodon microlepidotus*.

3. *Leuciscus macrolepidotus* Ayres (l. c., May 30).

Form much like that of *Leuciscus pulchellus*, though a little more slender. Anal fin longer. Caudal much emarginate. Scales 60. Size of the preceding.

This is evidently the species described in August of the same year by Baird and Girard as *Pogonichthys inaequilobus*, under which name it was afterwards mentioned by Dr. Ayres.

It must therefore take the less appropriate name of *Pogonichthys macrolepidotus*. This is now the "Split-tail" of the markets.

4. *Leuciscus gracilis* (sic) Ayres (l. c., May 30).

Body slender; head much elongate. Color silvery, becoming darker on the back. Scales about 80; much larger than any other known *Leuciscus*, weighing, it is said, 30 pounds or more, but generally varying, as we find it in the markets, from 5 to 20 pounds. This is the species here known as Salmon Trout, &c. \* \* \*

This species was described soon after by Dr. Ayres in the Proceedings of the California Academy of Sciences, 1854, p. 19, as *Gila grandis*. It is apparently identical with the prior *Ptychochilus oregonensis* of Richardson. This species is now no longer called "Salmon Trout," its market name being "Pike."

The small-sealed *Ptychochilus* (? *vorax* of Girard) was not then noticed by Dr. Ayres.

5. *Catostomus occidentalis* Ayres (l. c.).

Soon after reconsidered by Dr. Ayres, in the Proceedings of the California Academy, under the same name, and also still later by Professor Agassiz (Am. Journal Sci. Arts, 1855), still as *Catostomus occidentalis*.

SAN FRANCISCO, CAL., March 20, 1880.

#### NOTE ON "SEMA" AND "DACENTRUS."

By DAVID S. JORDAN.

In the Bulletin of Hayden's United States Geological and Geographical Survey, vol. iv, No. 2, 1878, I published "Notes on a collection of fishes from the Rio Grande at Brownsville, Tex." In this paper are characterized two new species, "*Sema signifer*" (p. 399), and "*Dacentrus lucens*" (p. 667).

These species must be suppressed. The former is a foetal Embiotocoid, apparently *Cymatogaster aggregatus*, the other is the young of *Hysteroecarpus traskii*.

The latter discovery was made before the paper was printed, but by inadvertence it was sent to the press during my absence in the field.

Of course neither of these species really came from the Rio Grande at Brownsville, Tex., and their presence in a jar otherwise containing only Texas fresh-water fishes is the only excuse for the gross blunders as to their relationships.

SAN FRANCISCO, CAL., March 20, 1880.

#### DESCRIPTION OF A NEW SCORPENOID FISH (SEBASTICHTHYS PROBIGER), FROM MONTEREY BAY, CALIFORNIA.

By DAVID S. JORDAN and CHARLES H. GILBERT.

Allied to *S. oralis* and *S. elongatus*, having the mouth, spines, and fins of the former and the color and general appearance of the latter.

Body elongate, a little deeper than in *S. elongatus* and somewhat more compressed, tapering slowly backward into a slender caudal peduncle, which is rather shorter and stouter than in *S. elongatus*.

Head rather short and small, the profile somewhat steeper than in *S. elongatus*. Mouth small, much as in *S. oralis*, the short, narrow maxillary extending to below the middle of the eye, the premaxillary on the



level of the lower margin of the pupil. Lower jaw strongly projecting, with a conspicuous symphyseal knob. Eye very large, longer than snout. Preorbital with its neck extremely narrow, armed with a slight spine.

Spinous ridges on top of head very low and weak, about as in *S. oralis*, rather lower and narrower than in *S. atrovirens* and *S. pinuiger*. The following pairs of spines are present: Nasal, preocular, supraocular, tympanic, and occipital, five pairs in all, as in *S. elongatus*. The ridges are most of them partly covered by scales. Preocular spine little prominent. Supraocular ridge very little developed, its length two-fifths that of the eye (in *S. elongatus* two-thirds). Tympanic spine minute. Occipital ridge not conspicuous, the spine depressed.

Preopercular spines sharp, rather shorter than in *S. elongatus*, but similar, the second longest, the points of all directed backward rather than radiating. Opercular spines moderate; bluntish points on subopercle and interopercle. Two bluntish suprascapular spines.

Interorbital space broad, nearly as broad as the eye, somewhat regularly convex, the middle being elevated. In *S. elongatus*, as in most of the red species, the interorbital space is transversely concave.

Gill-rakers very long, slender, and numerous, about  $10 + 30$ , the longest longer than the supraocular ridge, and about half the diameter of the eye.

Scales rather small, as in *S. oralis*, in about 65 transverse series, the accessory scales rather few.

Dorsal fin very low, as in *S. oralis*, not deeply emarginate, the shortest (twelfth) spine two-thirds the height of the fifth, which is little more than one-third the length of the head. Soft dorsal low, nearly twice as high as long, the highest ray about equal to the longest spine. Caudal fin moderately forked. Anal fin very low, its length about equal to the height of its longest ray. \* Second spine much longer and stronger than the third, scarcely shorter than the longest ray.

Pectorals shortish and rather narrow, the base rather wider than the eye, the tips reaching beyond the tips of the ventrals to the vent.

D. XIII, 13; A. III, 7.

Coloration very similar to that of *S. elongatus*, red, with olive markings. There is, however, more blackish and less greenish.

Ground color bright light red. Body mottled above with dusky olive-green, the ground color forming distinct blotches under the third dorsal spine and under the first and last rays of the soft dorsal. *Lateral line running in the middle of a very distinct continuous red stripe*, precisely as in *S. elongatus*. Head above with purplish cross-shades. Opercle with a dusky blotch: two olive shades radiating from the eye. Lips and tip of lower jaw blackish (red in *elongatus*). Eyes red. Caudal fin bright red, speckled with dark olive. Spinous dorsal bright red, the posterior part of each membrane blackish; soft dorsal olive and red: lower fins bright light red, with shades of olive-yellow.

This species is known to us from about eight examples obtained in the San Francisco market. They came from Monterey Bay, in a box containing *Sebastichthys rosaceus*, *constellatus*, *elongatus*, and *chlorostictus*, species all similar in size and redness of color. Later about sixty examples were obtained, all from deep water about Monterey and the Farallones.

The relations of *Sebastichthys proriger* seem to be most intimate with *S. oralis* (Ayres), from which it differs in the more elongate form, the red color, and the absence of the postocular spine. It resembles superficially *S. elongatus* most, and its position is evidently between *oralis* and *elongatus*. Its relations with *S. pinniger* are also not remote. To the green *S. oralis*, *S. proriger* bears the same relation that the red *S. pinniger* does to the green *S. atrovirens*.

In the following table comparative measurements of *S. pinniger*, *oralis*, and *elongatus* are given for purposes of comparison with *proriger*:

Table of comparative measurements.

	Ovalis.	Proriger.	Elongatus.	Pinniger.
Total length, in inches .....	9	9.45	12.6	8.33
Length to base of caudal (=100) .....	7.6	8	10.7	7.17
Body:				
Greatest depth .....	.32	.30	.285	.38
Least depth of tail .....	.09	.09	.09	.129
Head:				
Greatest length .....	.38	.34	.38	.368
Snout .....	.085	.087	.087	.10
Orbit .....	.08	.095	.105	.10
Interorbital space .....	.08	.08	.057	.07
Preorbital, least width .....	.01	.013	.023	.016
Maxillary .....	.123	.14	.17	.17
Mandible .....		.18		
Longest gill-raker .....	.05	.045	.043	.055
Occipital ridge .....	.055	.06	.07	.07
Supraocular ridge .....	.032	.04	.07	.04
Dorsal:				
Distance from snout .....	.327		.353	
Longest spine .....	.11	.12	.135	.16
Longest soft ray .....	.12	.128	.127	.168
Length of base .....		.59		
Anal:				
Length of base .....	.14	.13	.12	.16
Second spine .....	.11	.14	.155	.13
Third spine .....	.09	.118	.106	.145
Longest soft ray .....	.12	.15	.135	.195
Caudal:				
Middle rays .....	.12	.13	.128	.18
Outer rays .....	.17	.175	.175	
Pectoral:				
Length .....	.275	.28	.28	.30
Width of base .....	.09	.09	.09	.098
Ventral length .....	.20	.19	.19	.295
Scales, number of transverse rows .....	63	65	45	43

MONTEREY, CAL., March 25, 1880.

**DESCRIPTION OF A NEW AGONOID (AGONUS VULSUS), FROM  
THE COAST OF CALIFORNIA.**

**By DAVID S. JORDAN and CHARLES H. GILBERT.**

Body elongate, tapering rapidly to the long tail, everywhere broader than high. It is highest and broadest at the shoulders, but is lower and narrower than the head.

Head acutely triangular as viewed from above, the profile irregularly sigmoid; lower surface of head and body plane from the head to the tail. Mouth U-shaped, entirely inferior, the maxillary reaching to opposite the front of the pupil, the premaxillary in front to the base of the posterior pair of rostral spines. The distance from the anterior margin of the premaxillaries forward to the tip of the rostral spines equals more than half the length of the snout, more than half the diameter of the eye, less than one-fifth the length of the head. Lips thickish. Upper jaw protractile. Teeth small, in a villiform band, none evident on the vomer or palatines. Maxillary mandible and branchiostegal region with some small scattered cirri; under side of snout with few barbels or none. Eyes large, nearly as long as snout,  $3\frac{2}{3}$  in length of head, the orbital bones forming a raised ridge around them. Interorbital space transversely concave, nearly straight longitudinally, with a lengthwise groove and two slight ridges. Profile depressed at the front of the eyes, thence nearly straight to the tip of the rostral spines.

Spines on head highly developed. On each side a stout straight rostral spine projecting horizontally forwards; at its base a stout spine curved backwards, upwards, and outwards; behind this a smaller one projecting upwards. Orbital ridge above serrated, and with two prominent recurved spines, one in front, the other behind; behind these a ridge on each side confluent with the dorsal ridges and each with four spines; between these the top of the head is roughish and somewhat concave, with traces of a median keel. At the occiput is a conspicuous pit between the above-mentioned ridges, broader than long and longer than deep. Just below these ridges, on each side, is another and more prominent ridge, also ending in four spines, the last very strong; this is continuous with the upper lateral keel of the body; below this, on the opercle, is a strong keel ending behind in a spine; still lower is an irregular ridge, armed with two or three irregular series of spines and tubercles, extending from the preorbital along the subortal and preopercle, ending in a stout preopercular spine; behind the pectorals this ridge again appears as the long lateral keel of the body.

Along the lower margin of the preopercle are three or four more bluntish spines. There are on the head between seventy and eighty more or less developed spinous processes.

Isthmus rather wide.

Body with four ridges on each side, formed by the series of scales. Each scale ending in a strong recurved spine, its roots forming strie on

the scales. Between the two lateral keels are traces of another keel; traces also exist between the two dorsal keels in front.

The spines are developed on all the keels except in front and behind on the two abdominal ones. The two dorsal keels, at about the eighth scale in front of the caudal fin, coalesce, after which the median furrow is obliterated and the spines continue double.

Just below the point of junction the abdominal keels also unite. The two lateral ridges remain distinct throughout. At the base of the tail, on each side, is a median spine between the lateral ridges.

The abdominal ridges are farthest apart behind the base of the ventrals, in front of which and behind which they converge, but anteriorly they do not meet. Breast with six or eight polygonal plates. Belly transversely convex, with traces of a furrow, into which the ventrals are depressible. Vent just behind the middle of the length of ventrals. Lateral line about forty.

Dorsal beginning behind the seventh dorsal scale, and extending over eight scales, four scales intervening between it and the soft dorsal, which covers seven scales. The anal begins under the end of the first dorsal, and extends over eleven scales. Dorsal spines very delicate and flexible. Pectorals reaching the eleventh scale in the upper lateral series. Ventrals beginning opposite the fifth scale and extending to the tenth.

Color nearly obliterated—dark brown, with blackish cross-bars, involving the fins. One bar across caudal, one across posterior part of soft dorsal and anal, one across posterior part of spinous dorsal and front of anal, and one across front of spinous dorsal. Pectorals black, with whitish edging. Caudal and ventrals blackish. Belly white.

*Dimensions, in hundredths, of length to base of caudal fin.*

Total length .....	4.1 inches	
To base of caudal.....	3.6 inches =	100
Height of body .....		12
Height of tail .....		4
Width of body .....		14
Length of head .....		25
Width of head .....		19
Depth of head .....		12
Diameter of orbit .....		7
Length of snout .....		9
Length of rostral spine .....		2.3
Cleft of mouth .....		6.5
Width of mouth .....		6.5
Width of occipital pit .....		6
Space between dorsals .....		8
From front of mandible to tip of rostral spine .....		6
Isthmus .....		6
Length of spinous dorsal .....		12.5
Length of soft dorsal .....		12.5
Length of anal .....		18
Length of pectoral .....		18
Length of ventral .....		8
Length of caudal .....		13.5

This species is known to us from about ten specimens picked out of piles of prawns in the San Francisco market. They are taken in the sweep-nets of the "Paranzelle" off Point Reyes.

It belongs to the group or genus termed *Podotheucus* by Professor Gill (typified by *Agonus acipenserinus*), which is distinguished from *Agonus cataphractus* by the longer spinous dorsal and by the greater number of plates on the breast. *Agonus rulsus* differs from *Agonus acipenserinus* in the much rougher head, the narrow suborbital, and in the slight development of the barbels, as well as in many minor respects.

*Agonus acipenserinus* is rather stouter, the head broader and smoother above, the turbinal bones more widely separated. The nasal spines are similar in the two species, as well as the position of the mouth. The preocular spine is obsolete, the interorbital space is broader and not corrugated, with two longitudinal ridges. Posterior part of head comparatively smooth, without pit at the occiput. Ridges and spines on posterior part of head continuous with those on the body, as in *A. rulsus*, but higher than those on the body, instead of smaller, as in the latter. Opercular ridge small, the bones feebly striate.

Suborbital region quite broad and smooth, with a strong ridge beneath, on which are three strong retrorse spines, below which is a groove. Preopercle with two radiating ridges, each ending in a spine. About 28 spinous projections on the head in all, the number on the suborbital region much less than in *rulsus*. Eye much smaller than in *A. rulsus*, much shorter than snout, nearly 4 in head. Ocular ring not serrated, developed only above the eye. Body similarly armed, but the spines rather blunter and the back and belly less concave. There are no series of spines along the bases of pectorals and caudal. The abdominal series join behind close to the end of the ventrals, as the dorsal series close behind the second dorsal. The dorsal fins are separated by about two scales. The ventral fins are short, the fin scarcely half the length of the snout, the vent close behind its base; no visible groove ("Podotheucus") at their base. Pectorals reaching about to front of anal. Breast with about nine large plates. Isthmus present.

D. IX, 7; A. 8. Lat. 1. 37.

Barbels greatly developed, as long as the diameter of the eye, arranged in three tufts, one at each angle of the mouth and one under the snout. None on the branchiostegal region. The type of the present description of *Agonus acipenserinus* is in the museum of the California Academy of Sciences, and came from Vancouver's Island. It does not agree well with the account of *Podotheucus peristethus* of Gill, although Professor Gill considers the two identical.\*

SAN FRANCISCO, CAL., March 1, 1880.

\* See also Steindachner (Ichthyol. Beiträge, ix, p. 18), where the same opinion is expressed. In this article ("Ueber zwei neue Agonus-Arten aus California") *Brachyopsis verrucosus* Lockington is described as *Agonus (Brachyopsis) Barkani*, and *Brachyopsis xyosternus* Jor. & Gilb. as *Agonus (Brachyopsis) Annae*. The date of publication of *B. verrucosus* is May 24, of *B. xyosternus*, July 2, while *A. Barkani* and *A. Annae* were "Vorgelegt in der Sitzung am 15 Juli 1880." It is certain, therefore, that the American names are entitled to the right of priority.—D. S. J.



LIST OF SPECIES AND VARIETIES OF MINERALS IN THE NATIONAL MUSEUM OF THE UNITED STATES IN 1879.

By FRED. M. ENDLICH.

Albite.	Caolinite.	Epidote.
Allanite.	Carnallite.	Epsomite.
Allophanite.	Carpholite.	Erubescite.
Altaite.	Cassiterite.	Erythrite.
Alum.	Celestite.	Euchroite.
Amalgam.	Cerargyrite.	Euphyllite.
Amber.	Cerite.	Euxenite.
Amblygonite.	Cerussite.	Fergusonite.
Amphibolite.	Cervantite.	Fibrolite.
Actinolite.	Chabasite.	Fluorite.
Asbestos var.	Chalcanthite.	Forsterite.
Hornblende.	Chalcocite.	Fowlerite.
Tremolite.	Chalcodite.	Franklinite.
Analcite.	Chalcopyrite.	Gadolinite.
Anatase.	Chlorastrolite.	Galenite.
Andalusite.	Chlorite.	Garnet.
Chiastolite.	Chloritoidite.	Almandite.
Anglesite.	Chondrodite.	Grossularite
Anhydrite.	Chromite.	Melanite.
Anorthite.	Chrysoberyl.	Onvarovite.
Anthrophyllite.	Chrysolite.	Pyropite.
Antimony.	Cinnabarite.	Spessartite.
Apatite.	Clinochlorite.	Gehlenite.
Apophyllite.	Clintonite.	Genthite.
Aragonite.	Cobaltite.	Geyserite.
Argentite.	Columbite.	Gibbsite.
Argnerite.	Copiapite.	Glauberite.
Arsenicum.	Copper.	Glockerite.
Asphalt.	Copperasite.	Goethite.
Atacamite.	Coquimbite.	Gold.
Aurichalcite.	Cornndophyllite.	Graphite.
Azurite.	Corundum.	Greenockite.
Barite.	Cryolite.	Gysum.
Baritocalcite.	Cryptomorphite.	Selenite var.
Berthierite.	Cuprite.	Halite.
Beryl.	Cyanite.	Harmotomite.
Biotite.	Danburite.	Hauerite.
Bismuth.	Datholite.	Hausmannite.
Bitumen.	Deweylite.	Hauynite.
Boracite.	Diallogite.	Haydenite.
Borax.	Diamond.	Helvinite.
Bromyrite.	Diasporite.	Hematite.
Brookite.	Dolomite.	Columnar.
Brucite.	Domeykite.	Compact.
Caoxenite.	Dufrenite.	Micaceous.
Calamine.	Embolite.	Ochreous.
Calaverite.	Emerald.	Specular.
Calcite.	Emplectite.	Tabular.
Cancrinite.	Enstatite.	Hessite.

Heulandite.	Opal.	Quartz—Continued.
Hortonolite.	Fire opal.	Hornstone.
Howlite.	Milky opal.	Jasper.
Hydromagnesite.	Precious opal.	Noraculite.
Hydrotalcite.	Semi-opal.	Onyx.
Hypersthenite.	Wax opal.	Prase.
Idocrase.	Wood opal.	Rosy.
Ilmenite.	Orpiment.	Sandstone flexible.
Iodyrite.	Orthoclase.	Sardonyx.
Iolite.	Adularia.	Siliceous sinter.
Iridosmine.	Amazonstone.	Silicified wood.
Iron (meteoric).	Chesterlite.	Smoky.
Jamesonite.	Moonstone.	Quicksilver.
Jeffersite.	Ossidian.	Realgarite.
Kermesite.	Pumice.	Retinite.
Labradorite.	Sunstone.	Rhodonite.
Lanarkite.	Ozocerite.	Ripidolite.
Lapis lazuli.	Pectolite.	Rutile.
Laumontite.	Peridot.	Samarskite.
Lazulite.	Petzite.	Sassolite.
Leonhardite.	Pharmacosiderite.	Scapolite.
Lepidolite.	Phlogopite.	Scheelestinite.
Leucite.	Pickeringite.	Scheelite.
Liebethenite.	Picrophyllite.	Schirmerite.
Limonite car.	Pitchblende.	Schreibersite.
Linnaëite.	Pitticite.	Scorodite.
Liroconite.	Polybasite.	Serpentine var.
Magnesite.	Polyhalite.	Chrysotilite.
Magnetite.	P'olymygnite.	Ophite.
Magnolite.	Prehnite.	Precious.
Malachite.	Psilomelanite.	Siderite.
Manganite.	Pyrargyrite.	Sillimanite.
Marcasite.	Pyrite.	Smectite.
Margarite.	Pyrolusite.	Smithsonite.
Meerschauum.	Pyromorphite.	Sphalerite.
Meionite.	Pyrosclerite.	Spinel.
Melaconite.	Pyroxenite.	Spodumen.
Melanosiderite.	Angite.	Stannite.
Mesolite.	Coccolite.	Staurolite.
Metaciannabarite.	Hedenbergite.	Stephanite.
Millerite.	Jeffersonite.	Stercorite.
Mimetite.	Malacolite.	Stibnite.
Mineral coal var.	Sahlite.	Stilbite.
Molybdenite.	Uralite.	Strontianite.
Molybdate.	Pyrrhotite.	Struvite.
Muscovite.	Quartz.	Sulphur.
Garnet inclusions.	Agate.	Sussexite.
Hematite inclusions.	Amethyst.	Sylvanite.
Magnetite inclusions.	Aventurine.	Sylvite.
Tourmaline inclusions.	Basanite.	Tachydrite.
Natrolite.	Chalcedony.	Talc.
Nephelite.	Carnelian.	Tellurite.
Nitre.	Chrysoprase.	Tellurium.
Oligoclase.	Crystal.	Tennantite.
Aventurine oligoclase.	Flint.	Teschemacherite.
Olivinite.	Heliotrope.	Tetrahedrite.

Thomsonite.	Vivianite.	Wollastonite.
Titanite.	Wad.	Wolfenite.
Topaz.	Asbolite.	Xenotimite.
Pyenite.	Wavellite.	Zaratite.
Tourmaline.	Warwickite.	Zincite.
Troilite.	Wheelerite.	Zircon.
Trona.	Whitneyite.	Zoisite.
Turquoise.	Willemite.	Zorgite.
Ulexite.	Witherite.	
Vermiculite.	Wolframite.	

DESCRIPTION OF A NEW SPECIES OF *HEMIRHAMPHUS* (*HEMIRHAMPHUS* *ROSÆ*), FROM THE COAST OF CALIFORNIA.

By DAVID S. JORDAN and CHARLES H. GILBERT.

*Hemirhamphus rosæ*, sp. nov.

Allied to *Hemirhamphus unifasciatus* and other typical species of the genus.

Body rather elongate, moderately compressed; the greatest depth being one-ninth of the length from the snout to the base of the caudal. Length of the whole head, including the lower jaw, contained  $2\frac{2}{3}$  times in the length from tip of lower jaw to base of caudal. Length of the lower jaw beyond the tip of the upper jaw  $4\frac{1}{2}$  times in the same length. The length of the head from the tip of the upper jaw is contained  $3\frac{4}{5}$  times in the trunk (without head or caudal).

The triangular part of the premaxillaries is convex, slightly carinated above, and about as broad as long. The eye is rather large, somewhat less than the interorbital space, and about half of the postorbital part of the head. Mandible elongate, the narrowed tip slightly bent downward; the bone bordered on each side for its entire length by a conspicuous membrane, the membranaceous part being about as wide as the bony portion itself. Upper surface of mandible convex, grooved. Teeth in both jaws small, even, all of them apparently unicuspid. Top of head nearly plane, very slightly convex. Preorbital rather long; its diameter two-thirds that of the eye.

Scales rather small, very deciduous, about 63 in a longitudinal series.

Fin rays: D. I, 13; A. I, 14.

Dorsal and anal fins not at all scaly; the dorsal a very little longer than the anal and inserted slightly in front of it; the anterior rays of dorsal and anal moderately elevated. Caudal fin moderately forked; the lower lobe the longer; the middle rays nearly twice the diameter of the eye. Pectoral fin a little longer than the postorbital part of the head. Insertion of ventral fin slightly nearer the tip of the caudal fin above than the eye, and midway between the gill-opening and the base of the caudal. Ventrals a little shorter than the postorbital part of the head, not reaching vent.

Color translucent green, with the usual silvery band somewhat broader than a scale. Belly white. A dark vertebral band made of three streaks of dark points. Edges of scales with dark punctulations. Fins plain. Lower jaw dark blood-color; the ground-color red, rendered dark by punctulations. Bordering membrane deep red.

*Table of proportional measurements.*

Extreme length from chin to tip of tail.....	5.75 inches.	
Length from tip of upper jaw to base of tail.....	4.00 inches	100
Body:		
Greatest depth .....		11½
Greatest width .....		8
Least depth of tail .....		4½
Length of caudal peduncle .....		6
Head:		
Length from tip of lower jaw .....		50
Length from tip of upper jaw .....		20
Width of interorbital area .....		6
Length of mandible from eye .....		36
Length of snout .....		6
Diameter of orbit .....		5
Dorsal:		
Distance from snout .....		76
Length of base .....		16
Greatest height .....		7
Anal:		
Distance from snout .....		78
Length of base .....		14
Caudal:		
Length of upper rays .....		13
Length of middle rays .....		11
Length of lower rays .....		14
Pectoral length .....		11½
Ventral:		
Distance from snout .....		63
Length .....		7½
Dorsal rays .....		I, 13
Anal rays .....		I, 14

This species is abundant in the bay of San Diego and in the harbor of San Pedro. At San Diego we obtained in the winter, a very large number of immature individuals. At Wilmington we secured one specimen nearly adult, and saw numerous others swimming about near the surface in the muddy waters of the harbor.

We have named this species for Miss Rosa Smith, of San Diego, who has given much attention to ichthyology, and to whom the National Museum is indebted for many specimens of San Diego fishes.

SAN DIEGO, CAL., *August 10, 1880.*

**DESCRIPTIONS OF SEVEN NEW SPECIES OF FISHES FROM DEEP SOUNDINGS ON THE SOUTHERN NEW ENGLAND COAST, WITH DIAGNOSES OF TWO UNDESCRIBED GENERA OF FLOUNDERS AND A GENUS RELATED TO MERLUCIUS.**

**By G. BROWN GOODE.**

On the 4th of September, 1880, the Fish Commission steamer "Fish Hawk" made a two days' trip from the summer station at Newport, R. I., to the edge of the Gulf Stream. Several hauls of the trawl-net were made at the following stations: Nos. 865, 866, 867; lat.  $40^{\circ} 5'$ ; long.  $70^{\circ} 23' W.$ ; depth, 65 fathoms. No. 868; lat.  $40^{\circ} 1' 42'' N.$ ; long.  $70^{\circ} 22' 30'' W.$ ; depth, 162 fathoms. No. 869; lat.  $40^{\circ} 2' 18'' N.$ ; long.  $70^{\circ} 23' 6'' W.$ ; depth, 192 fathoms. No. 870; lat.  $40^{\circ} 2' 36'' N.$ ; long.  $70^{\circ} 22' 58'' W.$ ; depth, 155 fathoms. No. 871; lat.  $40^{\circ} 2' 54'' N.$ ; long.  $70^{\circ} 23' 40'' W.$ ; depth, 115 fathoms. No. 872; lat.  $40^{\circ} 5' 39'' N.$ ; long.  $70^{\circ} 23' 52'' W.$ ; depth, 86 fathoms.

The results of this day's work are unparalleled in the history of the Commission. Over 120 species of invertebrates and fishes were added to the fauna of Southern New England. The list of fishes never before seen south of Cape Cod is as follows. The other fishes taken in the same hauls are also mentioned, inclosed in brackets:

1. *Glyptocephalus cynoglossus*, (Linn.) Gill; young; 869, 870.
2. *Monolene sessilicauda*, n. s., n. g.; 870, 871.
3. *Citharichthys aretifrons*, n. s.; 871, 872.
4. *Citharichthys unicornis*, n. s.; 870, 871.
5. *Thyris pellucidus*, n. s., n. g.; 871, 872.
6. *Macrurus Bairdii*, Goode & Bean; adult and young; 870.
7. *Macrurus carminatus*, n. s.; 870.
8. *Hypsicometes gobioides*, n. s.; 871.  
[*Phycis chuss*, (Walb.) Gill]? (No. 25925); 866.  
[*Merluccius bilinearis*, (Mitch.) Gill]; adult and young; 870, 871, 872.
9. *Phycis Chesteri* Goode & Bean; adult and young; 868, 869, 870.  
[*Phycis regius*, (Mitch.) Gill]; 870.
10. *Lycodes Verrilli*, Goode & Bean; 870.
11. *Anarrhichas lupus*, Linn.; young; 866.
12. *Peristedium miniatum*, n. s.; 865, 872.
13. *Sebastes marinus*, (Linn.) Lütken, 870, 871.
14. *Raia*, unkn. spec. (with numerous closely studded spines); 871.
15. *Raia*, unkn. spec. (in egg, with very long tail); 869.
16. *Myxine glutinosa*, Linn.; 869, 870.

On this same ground Gloucester fishermen, in 1879, obtained numerous specimens of *Lopholatilus chamaeleonticeps* never elsewhere taken.

The occurrence of *Phycis regius* and *Merluccius bilinearis* at such great depths is worthy of mention.



In the following paper are described the following genera and species, apparently never before observed :

*Monolene*, n. g. } *Pleuronectidae*.  
*Thyris*, n. g. }  
*Hypsicometes*, n. g. *Merlucciidae*?  
*Monolene sessilicauda*, n. s.  
*Citharichthys arctifrons*, n. s.  
*Citharichthys unicornis*, n. s.  
*Thyris pellucidus*, n. s.  
*Macrurus carminatus*, n. s.  
*Hypsicometes gobioides*, n. s.  
*Peristedium miniatum*, n. s.

I am greatly indebted to Mr. Frederick Gardner, jr., who has assisted in the preparation of this paper.

*Monolene*,\* new genus.

A genus of pleuronectoid fishes with thin elongate body and sessile caudal fin. Eyes upon left side very close together, and near to profile. Mouth moderate; the length of the maxillary less than one-third that of the head. Teeth minute in the jaws, in single series, nearly equal on both sides, though perhaps a trifle stronger on the blind side; absent on vomer and palatines. Pectoral fin upon blind side totally absent. Dorsal fin commences in advance of the eye upon the snout. Dorsal and anal rays simple. Caudal fin sessile, almost confluent with dorsal and anal. Ventrals normal. Scales rather large, etenoid upon colored side, cycloid upon blind side. Lateral line marked; on colored side strongly and angularly curved above the anterior two-thirds of the pectoral; on the blind side straight, rising slightly as it approaches the region of the gill-opening. Gill-rakers few, feeble. Vertebrae 43.

*Monolene sessilicauda*, new species.

Extreme length of specimen described 0.156<sup>m</sup>.†

The height of the body (38) is about three-eighths of the total length (without caudal), and is equal to twice the distance of the origin of the ventral from the snout (19); its height over the ventrals (25) is about five times the longitudinal diameter of the lower eye (5), the least height (8.5), at the base of the tail, slightly greater than the length of the lower jaw (8). The body is thin its greatest width (5) not exceeding the longitudinal diameter of the orbit.

Scales subcircular, with irregular outline, about 2 millimeters in diameter, or in diameter about one-fourth (1.25) the diameter of the eye. The posterior edge of each scale upon the colored side is pectinate with about fifteen denticulations. The scales of the blind side are oval, non-pec-

\* Etymology: *μόνος* = single; *ὤλενῃ* = an arm.

† No. 26004.

titate, about as large as those of the colored side. The head is everywhere closely thatched with scales, even to the edges of the lips, and small scales occur on the bases of the caudal, pectoral, and ventral fins, and upon the rays of the vertical fins nearly out to their tips. There are about 23 rows above and 25 below the lateral lines on the colored side, behind the curve of the line.

Lateral line of colored side strongly bent in its anterior part over the base and anterior two-thirds of the pectoral fin. There are about 92 scales in the lateral line, 72 of them in its straight portion. The arc of the curved portion of the lateral line (12) is slightly more than double the distance of its highest portion above the line of the straight portion of the line were it continued (5). The curve of the line is very peculiar, having two angles; that nearest the head being most obtuse. The lateral line on the blind side is nearly straight, slightly ascending above the abdominal cavity.

The length of the head (20) equals one-fifth of the standard length, and four times diameter of eye, or length of perenium (5). Distance from snout to margin of upper eye (5) much greater than distance to lower eye (3), and less than length of the maxillary (5.5), the posterior margin of which passes the perpendicular from the anterior margin of the lower eye. The width of the interorbital area is very small, less than one-sixth of the diameter of the eye. The length of the mandible (8) is two-fifths of the head.

The dorsal fin begins upon the snout in the perpendicular from the anterior margin of the lower eye. It is composed of from 99 to 104 simple rays (in five specimens), the longest of which in the posterior fourth of the fin; their length (9) nearly half that of the head. The anal fin begins between the tips of the ventral, close to the vent, and under the insertion of the pectoral. It is composed of 79 to 84 simple rays, the longest in the posterior fourth; their length (7) slightly more than one-third the length of the head.

The caudal is sessile, rounded, the middle rays in length (17) nearly double the longest dorsal rays.

The pectoral, present only on the colored side, is inserted close to the branched opening, its length (15) three-fourth that of the head.

The ventrals are upon the median ventral line, even in length (6), slightly shorter or nearly equal to the longest rays of the anal.

Color on the left side ashy brown, with numerous more or less distinct darker brown spots. On the blind side white. Pectoral blackish, with traces of lighter transverse bands.

Radial formula: D. 99-103; A. 79-84. Lateral line (92).

Eleven specimens, ranging in length from .094 to .156 millimeter, were taken, September 4, in hauls 870 and 871.

Current number of specimen .....	26,004. 870.		26,004b.		26,004c.		26,004e.	
Locality .....	Milli- meters.	100ths of length.	Milli- meters.	100ths of length.	Milli- meters.	100ths of length.	Milli- meters.	100ths of length.
Extreme length .....	156							
Length to end of middle caudal rays.	133	100						
Body:								
Greatest height .....		38						
Greatest width .....		5						
Greatest circumference .....		25						
Height at ventrals .....		25						
Least height of tail .....		8.5						
Head:								
Greatest length .....		20						
Distance from snout to upper eye .....		5						
Width of interorbital area .....		7.5						
Distance from snout to lower eye .....		3						
Length of operculum .....		5						
Length of maxillary .....		5.5						
Length of mandible .....		8						
Diameter of orbit, longitudinal.		5						
Dorsal (spinous):								
Distance from snout .....		3						
Greatest height .....		9						
Anal:								
Distance from snout .....		22						
Height at longest ray .....		7						
Caudal:								
Length of middle rays .....		17						
Pectoral:								
Distance from snout .....		21						
Length .....		15						
Ventral:								
Distance from snout .....		19						
Length .....		6						
Dorsal .....		103		102			103	103
Anal .....		84		81		99		79
Number of scales in lateral line .....		*92						
Number of transverse rows above lateral line .....		(23)						
Number of transverse rows below lateral line .....		(25)						
Number of vertebrae .....		5						

\*20 in curve.

**Citharichthys**, Bleeker.

A genus of pleuronectoid fishes. Mouth rather wide, the length of the maxillary almost one-third that of the head. Eyes upon left side, the upper one very near to profile. Teeth quite minute, on a single series in each jaw, rather more prominent upon the blind side. Vomerine and palatine teeth none. Pectoral fin upon blind side much shorter and with fewer rays than upon colored side. Ventrals also asymmetrical, the sinistral one upon the median ventral line, the dextral one slightly in advance and crowded up upon the blind side. Dorsal fin commences in front of the eye upon the snout. Dorsal and anal rays simple. Caudal fin subsessile, its peduncle not much developed. Scales large, flexible, cycloid, very deciduous. Lateral line strongly defined, straight or very slightly curved anteriorly. Gill-rakers short, rather stout, flexible. Vertebrae 34 (in *C. arctifrons*). Gill membranes broadly united below the throat; gill rakers lanceolate. Branchiostegals 5.

*Citharichthys arctifrons*, new species.

Extreme length of specimen described 137 millimeters.\*

The height of the body (37) is about three-eighths of its total length (without caudal), and is equal to about four times the height of the tail (9) and about five times its thickness (7).

The scales are irregularly polygonal, cycloid; the largest about 6 millimeters in diameter; the diameter (5) nearly equal to that of the eye. The scales are flexible, loosely arranged, and very easily detached, so that it is difficult to secure a specimen in good order. Small scales on the rays of the ventral fins. There are forty scales in the lateral line (on the colored side), which is sharply defined and straight, and seven or eight above and the same number below the lateral line at the broadest part of the body.

The length of the head ( $24-24\frac{1}{4}$ ) is about one-fourth that of the body, and four times the diameter of the eye (6). The interorbital space (1) is very narrow, equal to the difference in the distances from snout to lower eye (4) and snout to upper eye (5). The length of mandible ( $10-10\frac{1}{4}$ ) is about double the latter distance; the length of the maxillary ( $7-7\frac{1}{4}$ ) slightly more than the greatest width of the body.

The dorsal fin begins upon the snout, above the anterior margin of the upper eye. Its greatest height (13-15) is about three times the distance of its anterior ray from the snout. It is composed of 82 to 83 simple rays. The anal begins under the axil of the pectoral, its greatest height (14-15) equal to or slightly exceeding half the distance of its anterior ray from the snout. It is composed of 67 simple rays.

The caudal is subessile, triangular, of 16 rays; its length about equal to that of the head. In dorsal, anal, and caudal the rays appear to project beyond the connecting membrane half or two-thirds of their own length.

The pectorals are inserted far below the lateral line and close to the gill-opening. The pectoral on the colored side is composed of more rays (9-10) than that of the blind side (7), its length (17-19) being about double that of its mate (7-9). The ventrals are composed of 4 rays.

Color dirty light brown.

Radial formula: D. 82-3; A. 67; C. 16; P. 9-10-7; V. 5; L. lat. 40.

Numerous specimens, ranging in length from 90 to 140 millimeters, were taken, September 4, in hauls 870-871. The females were full of ripe spawn. It is not probable, therefore, that the average size of the species is much greater than that of the specimens described.

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\* No. 25908, Nat. Mus.



Current number of specimen .....	25,908.		871.	
Locality .....	871.		871.	
	Milli- meters.	100ths of length.	Milli- meters.	100ths of length.
Extreme length .....	137	100	122	100
Length to end of middle caudal rays .....	111	100	102	100
Body:				
Greatest height of middle dorsal .....		38.5		37
Greatest width .....		7		
Least height of tail .....		9		9
Head:				
Greatest length .....		24.25		24
Width of interorbital area .....		1		1
Length of snout to upper eye .....		5		5
Length of maxillary .....		7.25		7
Length of mandible .....		10.25		10
Distance from snout to lower eye .....		4		4
Diameter of orbit, longitudinal .....		6		6
Dorsal (spinous):				
Distance from snout .....		4.75		5
Length of base .....		96		
Greatest height, posterior $\frac{1}{2}$ .....		15		13
Anal:				
Distance from snout .....		28.75		27
Length of base .....		71		
Height at longest ray, posterior $\frac{1}{2}$ .....		14		15
Caudal:				
Length of middle rays .....		25.50		23
Pectoral:				
Distance from snout .....		25		25
Length .....		19-7		17-9
Ventral:				
Distance from snout .....		22		21
Length .....		11		10
Dorsal .....		83		82
Anal .....		67		67
Caudal .....		16		
Pectoral .....		10-7		9-7
Ventral .....		5		5
Number of scales in lateral line, from root of ventral obliquely back .....		40		40
Number of transverse rows above lateral line .....				1

**Citharichthys unicornis**, new species.

Extreme length of the specimen described (No. 26003) 69 millimeters.

The greatest height of the body (47) is slightly less than its length, and is about  $4\frac{1}{4}$  times its least height at the tail (11). The body is much higher than in *C. arcifrons*, its greatest height over the pectorals, the contours then descending in almost straight lines to the base of the tail. The thickness of the body (6) is less than in *C. arcifrons*, being contained nearly seventeen times in the standard length.

The scales are thin, deciduous, smaller than in *C. arcifrons*. There are about forty scales in the lateral line, which is slightly curved over the pectoral, and, as nearly as can be determined in the denuded specimens before me, about twelve rows above and twelve below the lateral line at the broadest part of the body.

The length of the head (25) is one-fourth of the standard length and about three times the diameter of the eye (9), or the distance from the snout to the upper eye (9). The interorbital space is wide (4), equal to the length of the snout, and diagonally crossed by a strong ridge, a continuation of two ridges which form the upper boundary of the lower and the lower boundary of the upper orbit.

The length of the maxillary (11) is less than half, that of the mandible



(13) more than half, that of the head. The teeth are minute, in single rows, closely set in the jaws, somewhat stronger upon the blind side. A strong short spine above the snout, at the anterior termination of the ridge at the lower margin of the upper eye. Hence the specific name *unicornis*.

The dorsal fin begins at the side of the preorbital spine, its anterior rays being slightly crowded over upon the blind side. It is composed of 73 to 75 simple rays. Its greatest height (13) is half the length of the head.

The distance of the anal from the snout (33) is one-third of the standard length. The number of rays is 60; their longest (13) equal in length to the longest dorsal rays.

The caudal is pointed, triangular, sub sessile; its length (22) twice that of the maxillary (11) and two-thirds the distance from the snout to the anal (33). The pectorals are inserted far below the lateral line. The pectoral of the colored side is twice as long (18) as the diameter of the eye, that of the blind side as long (13) as the longest dorsal rays. The former is composed of 10 rays, the latter of 4.

The length of the ventrals (11) is half that of the caudal. They are asymmetrically placed, as is described under the generic diagnosis.

Radial formula: D. 73-75; A. 60; P. 4 right, 10 left; L. lat. 40.

Color ashy gray, with dark lateral line. Eyes black.

Current number of specimen.....	26,003.	
Locality .....	870 and 871.	
	Milli- meters.	100ths of length.
Extreme length.....	69	.....
Length to origin of middle caudal rays .....	57	100
Body:		
Greatest height .....		47
Least height of tail .....		11
Head:		
Greatest length .....		25
Distance from snout to upper eye .....		9
Distance from snout to lower eye .....		5
Width of interorbital area .....		4
Length of snout .....		4
Length of maxillary .....		11
Length of mandible .....		13
Diameter of orbit, longitudinal .....		9
Dorsal (spinous):		
Distance from snout .....		5
Greatest height .....		13
Anal:		
Distance from snout .....		33
Height at longest ray .....		13
Caudal:		
Length of middle rays .....		22
Pectoral:		
Distance from snout .....		28
Length .....		18-13
Ventral:		
Distance from snout on colored side .....		26
Length .....		11
Dorsal .....		75-73
Anal .....		60
Pectoral .....		4 R., 10 L.
Number of scales in lateral line .....		40

**Thyris**,\* new genus.

I feel much hesitation in describing as a member of a new genus this little heterosome fish, which has all the appearance of being the larval form of some larger species. Since, however, it has attained almost the size at which one of the associated species begins breeding, and since I am unable to assign it to any genus already described, it seems desirable to give it a name which may serve to designate it, at least for the time being.

**DIAGNOSIS.**—A genus of heterosome fishes, with soft, transparent, elongate body. Head very short (in the single species contained about  $5\frac{1}{2}$  times in total length of body). Mouth small, toothless. Eyes upon left side, close together, the lower slightly in advance of the upper. Pectoral fin upon blind side shorter and with fewer rays than upon colored side. Ventrals crowded together upon median keel of body, their bases prolonged upon this keel. Dorsal fin commences in front of the eye upon the snout. Dorsal and anal rays simple. Caudal fin subsessile, almost confluent with dorsal and anal. Scales very small, thin, easily detached. Dorsal line marked, straight. Body translucent, colorless (except for three longitudinal stripes in the single species). The vertebræ can almost be counted through the flesh when the fish is held up to the light, and the arrangement of the gills is clearly visible through the opercular bones.

**Thyris pellucidus**, new species.

The length of the specimen described (No. 26005) is 72 millimeters.

The height of the body (32) is about one-third of its length (without caudal), the least height of the tail (7) one-fourteenth. The body is thin, pellucid, larval-like, divided into three longitudinal tracts by depressions at the bases of the rows of interspinous processes, as in *Glyptocephalus*.

The scales are small, thin, easily detached (none remain upon the specimen except a few in the lateral line). The number of transverse rows is estimated at one hundred and twenty, the number of rows above and below the lateral line at the widest portion of the body seventeen or eighteen. The scales in the lateral line are provided with a large central canal. The lateral line is straight on both sides.

The head is very small; its length (18) contained about five and one-half times in the total length of the body. The eyes are small, protruding, the upper almost perpendicularly above, though perhaps slightly posterior to the lower. The diameter of the eye (2) equals the width of the interorbital space (2) and is double the distance (4) from the snout to the upper eye, that from the snout to the lower eye (3) being intermediate. The mouth is small, the shape of the opening being somewhat like that in *Solea*, the upper jaw being somewhat hook-shaped. The length of the upper jaw (4) is two-thirds that of the mandible (6).

The dorsal commences on the snout in advance of the eye, and is com-

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\* Etymology: *θύρίς* = a window.

posed of 96 to 102 long, flexible, simple rays, their tips apparently extending far beyond the connecting membrane. The length of the longest rays (14) is double the least height of the body at the base of the tail (7).

The anal fin originates at a distance (22) from the snout contained four times and one half in the length of the body. It is composed of 76 to 81 rays, the longest of which are as long as the head.

The pectoral is inserted close to the gill-opening and far below the lateral line (midway from the black stripe upon the lateral line to the black stripe at the base of the interspinous processes of the anal fin). The pectoral upon the blind side is short, its length (2) equal to the diameter of the orbit, composed of about four or five rays; that upon the colored side longer, its length (3) equal to that of the snout, and composed of about twelve rays. The ventrals are both crowded upon the ventral keel, their bases prolonged upon the keel, their tips embracing the origin of the anal.

Radial formula: D. 96-102; A. 76-81; P. 12 left, 4-5 right.

Color: In life colorless, translucent. In alcohol yellowish white. Three prominent blackish longitudinal stripes or lines upon the left side. The stripe running from the branchial cleft to the base of the tail is less prominent than the two at the bases of the interspinous processes. On the lateral line of the right side there is no stripe, though the two lateral stripes are as prominent as upon the other side. Eyes black.

Current number of specimen .....	26,005.	
Locality .....	870, 871, and 872.	
	Milli- meters.	100ths of length.
Extreme length .....	72	-----
Length to end of middle caudal rays .....	60	100
Body:		
Greatest height .....		32
Least height of tail .....		7
Head:		
Greatest height .....		18
Distance from snout to upper eye .....		4
Distance from snout to lower eye .....		3
Width of interorbital area .....		2
Length of maxillary .....		4
Length of mandible .....		6
Diameter of orbit .....		2
Dorsal (spinous):		
Distance from snout .....		2.5
Greatest height .....		14
Anal:		
Distance from snout .....		22
Height at longest ray .....		18
Caudal:		
Length of middle rays .....		19
Pectoral:		
Distance from snout .....		18
Length .....		3-2
Ventral:		
Distance from snout .....		16
Dorsal .....		96-102
Anal .....		76-81
Pectoral .....		12 L., 4-5 R.
Number of scales in lateral line .....		*120

\* Estimated from partial count.

*Macrurus carminatus*, new species.

A single specimen, 248 millimeters in length, was obtained, September 4, at station 871. It is most closely related to *M. calorkhynchus* (Risso) Bonap. and to *M. atlanticus* Lowe, but differs in the number of fin-rays and in other characters.

The body is less elongate and stouter than in *M. Bairdii*, Goode & Bean, though its greatest height (12.5) is, as in *M. Bairdii*, one-eighth of total length. The difference in general appearance is due to the fact that in *M. carminatus* the ventral contour retreats less rapidly.

The scales are large, heavy, the free portions covered with long vitreous spines arranged in nine or ten rows. These scales resemble the old-fashioned wool cards. Hence the specific name, from *carmen*, a wool-card. The spines are thicker and more closely set than in *M. Bairdii*, and there is no specialization of the central row. The number of scales in the lateral line cannot be determined, though it probably does not exceed 100, but there are about five transverse rows above it and twelve below it, counting from the vent obliquely backward. In *M. Bairdii* there are 152 in the lateral line, six above and nineteen or twenty below.

Length of head (21) contained a little less than five times in total length. Width of interorbital area (4) about equal to vertical diameter of orbit, and about one-fifth of the length of the head. Length of snout, horizontal diameter of eye, length of postorbital portion of head about equal (7). Length of operculum (35) half that of snout.

Snout long, sharp, depressed, triangular, the lower surface more nearly parallel with the axis of the body than in *M. Bairdii*. The lateral ridges are pronounced and are contained in a straight line under the eyes and upon the preopercula. Strong horizontal ridges continue from the suprabital margins to the gill-openings, parallel with the subocular ridges. Nostrils immediately in front of the orbit. Barbel very short.

Teeth small, conical, somewhat recurved, arranged in villiform bands.

Distance of first dorsal from snout (23.5) about four and one-half times the length of its base (5), its distance from anterior margin of orbit much less than the length of the head. First spine very short, hardly perceptible above the skin. Second spine about half as long (11) as the head, slender, unarmed. When laid back, its tip reaches the origin of the second dorsal (the filament is destroyed). The decrease in the length of the spines is very gradual, the sixth being nearly as long as the second, so that the fin is not so triangular in shape as in *M. Bairdii*.

The second dorsal begins in the perpendicular from the seventh ray of the anal. The anal is much higher than in *M. Bairdii*, the length of the longest rays (2) nearly equal to half the width of the interorbital area.

Anal fin inserted under the eighteenth scale of the lateral line (as nearly as can be judged from the distorted specimen). Its longest rays are as long as the width of the interorbital area.

Distance of pectoral from snout equal to twice its own length (11),



which is about equal to the length of the dorsal spine. Its insertion is below the middle of the depth of the body and below the level of the center of the orbit. Its tip does not reach to the perpendicular from the origin of the anal.

Insertion of ventral behind pectoral and slightly in advance of the insertion of the dorsal. Its distance from the snout (22) is greater than twice its length (9). Its long filament does not reach to the origin of the anal fin.

Radial formula: D. I, IX, 80 +; A. 76 +; P. 13; V. 7.

Color silvery gray. The thick, closely-set spines are matted with oozy mud which cannot be removed. This is doubtless the result of the hard usage experienced in the trawl-net.

Current number of specimen.....	26,007.	
Locality .....	871.	
	Milli- meters.	100ths of length.
Extreme length .....	248	100
Body:		
Greatest height under dorsal .....		12.5
Head:		
Greatest length .....		21
Width of interorbital area .....		4
Length of snout .....		7
Length of operculum .....		3.5
Length of mandible .....		7.25
Diameter of orbit .....		7
Dorsal (spinous):		
Distance from snout .....		23.5
Length of base .....		5
Height at first spine .....		11
Dorsal (soft):		
Distance from snout .....		35
Anal:		
Distance from snout .....		27
Pectoral:		
Distance from snout .....		21
Length .....		11
Ventral:		
Distance from snout .....		22
Length .....		10
Dorsal .....		I, IX, 80+
Anal .....		76+
Pectoral .....		13
Ventral .....		7
Number of scales in lateral line .....		[100]
Number of transverse rows above lateral line .....		(6)
Number of transverse rows below lateral line .....		(18)

#### **Hypsicometes**,\* new genus.

A small specimen, much contracted and distorted from immersion in strong alcohol, is the only material upon which to base this description. Although not quite satisfied that the relations of this fish are most nearly with *Merlucciidae*, I venture to assign it temporarily to a position in this family, hoping that additional material may confirm my present belief. In some respects it resembles the *Blennioids*, but pseudobranchiae are absent.

DIAGNOSIS.—A genus of fishes in general form closely resembling *Merluccius*, but with the elongate body covered with large scales (not

\* Etymology:  $\psi\mu$  = in deep water;  $\kappa\omega\mu\tau\eta\varsigma$  = an inhabitant, a dweller.



much more than half as many in lateral line as in *M. bilinearis* nor one-third as many as in *M. vulgaris*). Mouth rather small. A separate caudal. Two dorsal fins, the first composed of a few long rays, the second with longer base. One elongate anal. Ventrals well developed, with broad base composed of six rays. Teeth on the vomer and in the jaws in two or three rows, rather feeble. The eyes large, near together, looking upward. No barbel.

**Hypsicometes gobioides**, new species.

The general appearance of the fish is suggestive of a species of *Gobius*.

Head rather broad and somewhat depressed; its greatest width (13) about equal to the greatest height of the body (12), and less than one-half its length (30), which is contained three times and one-third in the standard length. The cleft of the mouth is horizontal, extending to the perpendicular from the anterior margin of the orbit. The snout is broad, rounded, as long (10) as the longitudinal diameter of the eye. The interorbital space is narrow (2), one-fifth the length of the snout, the eyes large, very close together, looking upward. The length of the maxillary (13) is equal to the greatest width of the head. The mandible is much longer. Teeth minute, in two or three rows on jaws and on vomer. Gill-opening wide, the membranes united over the isthmus near the snout.

Body shaped much as in young of *Merluccius*, the least height of the tail (5) about half of the greatest width of the body (11). The scales are large, about 58 transverse rows from gill-opening to base of caudal. The character of the scales and the position of the lateral line cannot be decided from the specimen described.

The dorsal originates above the base of the pectoral, and consists of six or seven flexible rays as long (10) as the snout. The second dorsal has a base four times as long (10) as the snout, and extends nearly to the base of the caudal. It is composed of about seventeen rays, the longest slightly longer (11) than the longest in the first dorsal.

The origin of the anal is under that of the second dorsal; its base length (48) is equal to the distance of its anterior ray from the snout (48). It is composed of about sixteen rays, the longest of which (10) is equal to the longest in the first dorsal.

The caudal is truncate, its length (18) three-eighths of that of the base of the anal.

The insertion of the pectoral is distant from the snout (33) one-third of the distance from snout to base of caudal. Its length (10) equal to the height of the first dorsal.

The ventrals are far apart, with broad bases lying flat upon the ventral surface, composed of six rays. They are situated far in advance of the pectorals and their length (14) equals two-fifths of the distance from snout to first dorsal.

Radial formula: D. VI (or VII), 17; A. 16; V. 6; L. lat. 158.

Color grayish, with obscure cloudings. Belly lighter. A large black blotch upon the base of the upper caudal rays.

	Milli- meters.	100ths of length.
Extreme length.....	54	.....
Length to end of middle caudal rays.....	46	100
Body:		
Greatest height.....		12
Greatest width.....		11
Least height of tail.....		5
Head:		
Greatest length.....		30
Greatest width.....		13
Width of interorbital area.....		2
Length of snout.....		10
Length of maxillary.....		13
Diameter of orbit, longitudinal.....		10
Dorsal (spinous):		
Distance from snout.....		35
Length of base.....		8
Greatest height.....		10
Dorsal (soft):		
Length of base.....		40
Height at longest ray.....		11
Anal:		
Distance from snout.....		48
Length of base.....		48
Height at longest ray.....		10
Caudal:		
Length of middle rays.....		18
Pectoral:		
Distance from snout.....		33
Length.....		10
Ventral:		
Distance from snout.....		23
Length.....		14
Dorsal.....		VI-[VII], 17
Anal.....		16
Ventral.....		6
Number of scales in lateral line.....		[58]

**Peristedium miniatum**, new species.

Total length of type (No. 26023) 300 millimeters.

The greatest width of the body (20) is equal to its greatest height (19.5), being one-fifth of its total length without caudal. The general armature of the body is much like that described by Günther under *Peristethus brevivirostre*.\* The number of plates between the gill-opening and the base of the tail is from twenty-seven to twenty-nine. There are four series of spiny plates on each side, the spines of the abdominal series becoming very weak and obsolete towards the tip of the tail.

The length of the head (40.15) is two-fifths of the total length without caudal. The length of the preorbital processes (7) is contained about three times and one-half in the distance from their extremities to the anterior margin of the orbit. The interorbital space is deeply concave, its width (6.75) contained between six and seven times in the length of the head. Protuberance on the forehead very slight. The length of the snout (22.5) is more than half that of the head (in young less). The diameter of the eye (65) is contained between six and seven times in the length of the head. There is one pair of spines upon the upper surface of the snout behind the base of the preorbital processes, and another larger pair upon the preorbital processes, one upon each. The ridge of the preoperculum terminates in a depressed, short, sharp-pointed spine. The number of small tentacles upon either side of the lower jaw is about

\* Cat. Fish. Brit. Mus. ii, 1860, p. 218.

ten, the smallest nearest to the symphysis. The long tentacles at the angles of the mouth are fringed and extend to the base of the pectorals. In other respects Günther's description of *P. brevirostre* is ample for this species.

Color bright crimson.

Radial formula: D. VII, 18; A. 17; C. 16; P. 2 + 10; V. 6. L. lat. 27 on one side, 28 on the other.

Three other specimens had the following: D. VIII, 18; A. 17. D. VII, 18; A. 18. D. VII, 18; A. 18.

The measurements of adult and young specimens are given. The fish when taken seemed to be in the height of the spawning season.

Current number of specimen .....		26,023. 869.		26,030. 871 (young).	
Locality .....					
		Milli- meters.	100ths of length.	Milli- meters.	100ths of length.
Extreme length .....	300			53	
Length to end of middle caudal rays .....	272	100		45	100
Body:					
Greatest height at origin of dorsal .....		19.50			19
Greatest width under pectorals .....		20			15
Height at ventrals .....		19.50			18
Least height of tail .....		2.75			3
Head:					
Greatest length .....		40.50			39
Distance from snout to nape .....		32.75			36
Greatest width .....		29			30
Width of interorbital area .....		6.75			12
Length of snout .....		22.50			18
Length of operculum .....		10			7
Length of maxillary .....		12			14.50
Length of mandible .....		12.50			13
Distance from snout to orbit .....		21			19
Diameter of orbit, longitudinal .....		6.50			10
Width of mouth-opening .....		12			13
End of frontal spine to symphysis of maxillaries .....		7			6
Length of barbels .....		29			10
Dorsal (spinous):					
Distance from snout .....		38.25			40
Length of base .....		53.50			53.50
Greatest height, second spine .....		10.75			10.75
Height at first spine .....		10			10
Height at last spine .....		3			6
Width of upper surface of occipital plate .....		7			12.50
Length of upper surface of occipital plate .....		4.75			8
Width of upper surface of naxal plate .....		6.50			6.25
Length of upper surface of naxal plate .....		5			3
Anal:					
Distance from snout .....		53.50			51
Length of base .....		36			40
Height at first spine .....		3.50			3
Height at second spine .....		6.50			7
Height at third spine .....		8			8
Height at last spine .....		4			4
Caudal:					
Length of middle rays .....		9.50			14
Length of external rays .....		5			
Pectoral:					
Distance from snout .....		33			34
Length .....		18.25			14
Ventral:					
Distance from snout .....		31			30
Distance from symphysis of mandibles .....		37.25			40
Length .....		17.50			20
Isthmus .....		15.50			15
Dorsal .....		VII, 18			VII, 18
Anal .....		18			18
Caudal .....		16			
Pectoral .....		2+10			
Ventral .....		6			
Number of plates in lateral line .....		28			
From anterior edge of frontal plate to end of frontal spine .....		9.50			8

DESCRIPTION OF A NEW SPECIES OF *ICTERUS* FROM THE WEST INDIES.

By GEORGE N. LAWRENCE.

*Icterus oberi*.

Male: Head, neck, upper part of breast, back, wings, and tail black; lower part of breast, abdomen, under tail-coverts, and rump light-brownish chestnut, with the concealed bases of the feathers of a clear light yellow; the thighs are yellow, with a wash of chestnut; edge of wing and under wing-coverts yellow; bill black, with the sides of the under mandible bluish for half its length from the base; tarsi and toes black.

Length (skin),  $8\frac{1}{2}$  inches; wing,  $3\frac{3}{8}$ ; tail, 4; tarsus,  $\frac{7}{8}$ ; bill,  $\frac{7}{8}$ .

The female has the upper plumage of a dull greenish olive, with a yellowish tinge, the front and rump inclining more to yellow; the tail feathers are yellowish green; quills brownish black; the primaries and secondaries are edged narrowly with dull yellowish gray; the tertiaries are margined with fulvous; wing-coverts dark brown, margined with fulvous; edge of wing yellow; the under plumage is of a rather dull dark yellow; the breast and under tail-coverts are of a deeper or warmer color; the sides are greenish olive; bill and legs as in the male.

The young male resembles the female in plumage, but has the back somewhat darker.

Types in National Museum, Washington.

It differs from all its allies, which are somewhat similarly colored, in having the shoulders black, instead of yellow or chestnut.

Seven specimens were obtained.

In the early part of March of the present year, Mr. Ober left for the West Indies, intending to explore as many of the islands not visited on his first expedition as his limited time would permit. He returned after an absence of six months, and his collections sent to the Smithsonian Institution were placed in my hands for examination. Among them I found but one new species, viz, the *Icterus* above described, procured in Montserrat.

It seems but a fitting compliment that the only new species commemorative of the second expedition of Mr. Ober should bear his name.

The catalogues of the birds obtained by him in the different islands will be published in the Proceedings of the National Museum as soon as he furnishes me with his notes and observations thereon.

OCTOBER 15, 1880.



**DESCRIPTION OF A NEW SPECIES OF NOTIDANOID SHARK (HEXANCHUS CORINUS), FROM THE PACIFIC COAST OF THE UNITED STATES.**

**By DAVID S. JORDAN and CHARLES H. GILBERT.**

*Hexanchus corinus*, sp. nov.

Head large, broad, depressed and very blunt anteriorly; the length of snout from front of mouth little more than half the interorbital space and rather less than the distance from the front of the mouth to angle of the mouth.

No median tooth in upper jaw. Two sharp, slender teeth in front of upper jaw, behind which is a row of four others similar but a little larger; the two outer larger than the inner, all without basal cusps. Behind these are four others similar and still a little larger. These are directed backward, and should not be considered as functional teeth.

The first of the large teeth in the upper jaw is larger than the succeeding teeth. It has a sharp point hooked outward, and a single strong cusp on its outer margin, its inner edge not serrate. The second tooth, on both sides, has the basal cusp obsolete. The third tooth is like the first, but a little smaller. The fourth tooth is slightly serrated on the inner margin, and has two strong cusps on the outer at base. The fifth and sixth are similar to the fourth, but more strongly serrate on the inner margin. The seventh, eighth, and ninth are small, and the number of cusps is increased, so that they approach the form of the teeth of the lower jaw.

The median tooth of the lower jaw is very small, with a slight median cusp and three cusps on the outer margin, the uppermost the largest. The first lateral tooth has six cusps; the first the largest, the others progressively decreasing; the long edge of the first cusp is finely serrated, but has no basal cusp. The second, third, fourth, and fifth teeth are precisely similar in size and form to the first. The sixth and seventh are somewhat smaller. In the smaller specimen, from Soquel, the inner edge of the teeth is not serrated. Behind the large teeth in each jaw is the usual series of small blunt teeth, which in this species are little developed.

Nostrils near the tip of the snout. Furrow of skin at angle of mouth reaching half way from the angle of the mouth to the gill-opening. Eyes large,  $\frac{2}{3}$  the length of the snout. Spiracles small, far behind the eyes. Gill-openings 6. Pectoral moderate, as long as from first gill-opening to tip of lower jaw. Ventrals small, reaching past front of the small dorsal. Dorsal a little higher than anal, and terminating over the middle of the latter fin. Tail long, twice as long as head, a little less than  $\frac{1}{3}$  the total length, little bent upward; its basal lobe little developed; the scales on its upper edge somewhat enlarged.



Color very dark sooty, almost black above, grayish black below, without spots or distinct markings. A very obscure grayish lateral streak. Inside of upper lip blotched with black. Young specimen clear brown.

This species is known to us from two specimens, the larger, a female 43 inches in length, the type of the present description, having been obtained by James G. Swan, assistant to the United States Fish Commission, at Neah Bay, near Cape Flattery. The other was secured by Mr. Gilbert at Soquel, on the Bay of Monterey.

This species is closely related to *Hexanchus griseus* Raf. of the Mediterranean and Eastern Atlantic. It differs chiefly in the form of the teeth of the lower jaw, which are serrated on the inner edge, and have on the upper or outer edge only six cusps instead of eight or nine.

Another Notidanoid shark, belonging to the related genus *Heptranchias*, distinguished by the presence of seven gill-openings instead of six, is found with the present species in the same waters. This is *Heptranchias maculatus*, the *Notorhynchus maculatus* or *Notorhynchus borealis* of Ayres and Gill. This species differs from *Heptranchias indicus*, with which it has been confounded by Günther and Duméril, in the lack of a median tooth in the upper jaw, and in the longer tail, which forms rather more than a third of the total length.

*Heptranchias maculatus* is rather common on the coast of California from Monterey northward. In Humboldt Bay it is especially abundant, and the pursuit of it for the oil in its liver is an industry of some importance.

The teeth in this species undergo some changes with age, and at least are subject to some individual variations, as will be seen from the following descriptions, which may be compared with Professor Gill's account of the jaws of *Notorhynchus maculatus* (Proc. Ac. Nat. Sci. Phila. 1862, 495) from Nisqually, Washington Territory.

*Description of Heptranchias maculatus, juv., from Soquel.*

Head rather depressed, broad, rounded. The nostrils almost at the tip of the snout. Length of the snout much less than the interorbital width. Spiracle rather large, nearer the gill-openings than the eye. A long furrow at the angle of the mouth, above which the upper lip extends backward in a broad fold.

*In the upper jaw no median tooth*; two small teeth near together, well in front, simple and pointed; two a little larger, behind and outside of these; then two more, similar, near together and directly within the first pair; then directly behind the second pair mentioned two much larger ones, pointed, each with a conspicuous cusp on the outer edge near the base on each side, and one or more denticulations. The next tooth is similar, rather larger and directed more outward. The remaining five or six grow still more oblique, but are otherwise similar in form and size, but a little more serrated.

The median tooth in the lower jaw is broad, with two (or three) strong dentations on each side, directed outward, and a very small *median cusp*

at tip. The other teeth are very similar to each other, six in number on each side and slightly increasing in size from the middle. They are much broader than high, and armed with about four sharp points turned outward, besides one or two smaller ones. The first point is longest, and has a small cusp on its side, so that strictly one might call the second cusp longest.

Gill-openings 7, high; pectorals moderate, truncate and slightly concave behind; ventrals moderate, rather backward; anal small, the single small dorsal just in front of it, covering most of the interspace between it and the ventrals.

Tail very long, forming a little more than one-third the length ( $2\frac{3}{4}$ ). A notch near its tip below; the lower lobe a little developed. Upper edge of tail with about three series of scales, much enlarged, so that its entire edge is finely serrated.

Described from two specimens from Soquel, each 18 inches long, one male, the other female.

*Description of the jaws of Heptranchias maculatus, adult, from Humboldt Bay.*

No median tooth in upper jaw. Upper jaw with two transverse series of teeth on each side of symphysis, the outer series usually with two, the inner with four or five teeth, some of which are placed externally to the main row. They are lanceolate from a quadrate base, the points directed backwards and curved slightly outwards, without cusps or serrations. First tooth of main series similar to symphyseal teeth, but larger and broader, with a larger or smaller cusp at base on outer side and with or without minute serrations on base of inner side; from this towards corner of mouth there is much variation in the development of cusps and serratures, the teeth, however, constantly approximating in shape those of the lower jaw, always differing in being smaller, with external margins more inclined, and with the central cusp larger in comparison to others and more distant from them. Sometimes on each side are four or five teeth, bicuspidate and without serrations on inner edge; in other jaws the second or third tooth from symphysis has *three* or more cusps on the outer margin, and with serrulations or a single cusp at base on inner side. The last large tooth on each side usually broad and low, with the two margins subequal, without prominent median cusp; the inner margin minutely serrate; the outer with seven or eight cusps.

In lower jaw the teeth are much larger than in upper, and are uniform in shape and style of armature; they are wide from a quadrate base, the outer margins comparatively little inclined and with the cusps regularly and rapidly graduated, usually seven in number; the inner margins short, gibbous and much curved, always distinctly serrate; median tooth upright, without median cusp, and with three or four cusps on each margin.

Each jaw has laterally about 12 transverse series of small linear teeth,

scarcely elevated above surface of jaw, resembling the lateral teeth of *Heterodontus*, but much smaller and without median crest.

Teeth ca.  $\frac{12-7-2-2-7-12}{12-6-1-6-12}$ .

We may note here, as further additions to the list of sharks on our Pacific coast, the occurrence of *Somniosus microcephalus* (Bloch) Gill in Puget's Sound; of *Lamna cornubica* L. in Monterey Bay; and of a species closely related to *Eulamia lamia* (Risso) Gill in San Diego Bay. The shark recorded by us as *Pleuracromylon laevis* (Proc. U. S. Nat. Mus. 1880, 52) is *Rhinotriacis henlei* Gill. This species is not a genuine *Triacis*, and it appears to us to be congeneric with *P. laevis*, from which it differs in the greater development of the basal cusps of the teeth.

Table of measurements.

Species, *Hexanchus corinus* J. & G.; sex, ♀. Locality, Neah Bay, Washington Territory.

	Inches and 100ths.	100ths of length.
Extreme length .....	43	.....
Body:		
Greatest height .....		8
Head:		
Greatest length .....		16
Greatest width .....		12
Width of interorbital area .....		9
Length of snout .....		5½
Length of cleft of mouth .....		6½
Distance from eye to spiracle .....		5½
Length of nostril .....		1½
Distance from mouth to nostril .....		4
Height of first gill-opening .....		7
Dorsal:		
Distance from snout .....		53
Length of base .....		6½
Greatest height .....		0½
Anal:		
Length of base .....		6
Greatest height .....		4½
Caudal:		
Length .....		32
Pectoral:		
Length .....		12
Ventral:		
Length of base .....		8

INDIANA STATE UNIVERSITY,  
Bloomington, October 11, 1880.

**NOTICE OF RECENT ADDITIONS TO THE MARINE INVERTEBRATA,  
OF THE NORTHEASTERN COAST OF AMERICA, WITH DESCRIPTIONS  
OF NEW GENERA AND SPECIES AND CRITICAL REMARKS  
ON OTHERS.**

**PART II.—MOLLUSCA, WITH NOTES ON ANNELIDA, ECHINODERMATA, ETC., COLLECTED BY THE UNITED STATES FISH COMMISSION.**

**By A. E. VERRILL.**

The species included in the following paper, unless otherwise stated, have been collected by the parties employed by the United States Fish Commission for several years past in exploring the waters and investigating the marine animals of this coast.\* This work has been under the immediate direction of the writer, who has personally taken a part in most of the very numerous dredging excursions. The total number of stations dredged or trawled amounts to over 1,200. Among the large number of persons who have taken a more or less important part in these explorations, in connection with the invertebrate department, I may particularly mention Prof. S. I. Smith, Prof. A. S. Packard, Mr. Sanderson Smith, Mr. Richard Rathbun, Prof. H. E. Webster, Mr. Oscar Harger, Mr. E. B. Wilson, and Mr. S. F. Clark.

During the last three years Mr. Sanderson Smith has given special assistance in caring for the testaceous Mollusca in the dredging season, and has also been engaged with the writer at various other times in the working up of the Mollusca of Northern New England for publication. Owing to the great accumulation of materials, this will necessarily take much time. In the mean time the following catalogue will afford much useful information as to the additions recently made to our molluscan fauna.

This season, the most interesting and prolific region of our coast hitherto explored was discovered upon the outer bank, or slope, situated from 70 to 80 miles south of Martha's Vineyard, and from 90 to 115 miles south of Newport, R. I.

In September and October three very successful trips were made to this region.

The first of these trips was made September 3 to 5, south of Martha's Vineyard, about 70 to 80 miles (stations 865 to 872), where the depth was from 65 to 192 fathoms. The bottom was mostly fine compact sand, with some mud, and with a large percentage of Foraminifera. The

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\* In this article 115 species of Mollusca are recorded as recent additions to the fauna of New England. Of these, 48 species are apparently undescribed (including 23 species just published in the American Journal of Science, for November). The number of species included in this article that are not contained in the last edition of Gould's Invertebrata of Massachusetts is 125. Many other species, not here included, have previously been added by me to those contained in Gould's work. Many of these are enumerated in the author's Preliminary Check List of the Marine Invertebrata of Northern New England, 1879. Many will be found in various articles in the American Journal of Science; others are contained in the Report on Invertebrates of Vineyard Sound, in Part I of the Reports of the United States Fish Commission, 1873.



second trip was made September 12 to 14, nearly south from Newport, 90 to 105 miles, where the depth was from 85 to 325 fathoms (stations 873 to 881). The third trip, October 1 to 3, was to the same region, but somewhat farther west and south, and in deeper water (stations 891 to 895). At all these stations, except 867, a large beam-trawl was used; at 867 a heavy "rake-dredge", of a new form, was used with good success.

All these stations are situated in the region designated on the charts as "Block Island soundings", and nearly all proved to be exceedingly rich in animal life, the vast abundance of individuals of many of the species taken being almost as surprising as the great number and variety of the species themselves.

In this region the slope is exceedingly gradual till the depth of 75 to 100 fathoms is reached, at about 90 miles from the coast; the slope then becomes much more rapid, but yet not steep, and the bottom is of very fine compact sand, mingled with more or less mud, fragments of shells, and sometimes with small stones,\* and generally has a smooth and rather hard surface, well adapted to support a very great variety of animals of nearly all classes. In some places the material is softer mud and sand; in others it is covered with broken shells and great numbers of sponges, hydroids, and worm-tubes.

Many species owe their existence, on these bottoms, to the suitable places of attachment furnished by the large tubes of annelids, which formed a marked feature in many of the localities.

In several localities with muddy bottoms (869, 879, 880, 894), we trawled large quantities (several thousands in all) of very singular, large, round, unattached worm-tubes, occupied by a large, undescribed species of *Hyalinæcia*.† These tubes are firm and translucent, composed of a tough substance resembling the quills of birds. They are open at both ends, but often have internal septa near the larger end; they are often more than a foot long, and about a third of an inch in diameter at the

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\* These stones, which were common in nearly every haul of the third trip, are of all sizes, from small pebbles up to boulders 6 inches or more in diameter. They are of various kinds of rocks, like those found in the drift formation along the opposite shores of the mainland and on the shores of Block Island and the eastern end of Long Island. Their presence, so far from land and beneath the edge of the Gulf Stream, can easily be explained by supposing that they have been carried out to sea by the shore ice that forms along these coasts in winter in vast quantities and of considerable thickness. This ice, when it breaks up in spring, is carried out to sea, with its inclosed stones and gravel, by the tides and currents, till it comes in contact with the warmer waters of the Gulf Stream, where its loads of stones drop to the bottom. We have often met with large, loose, and fresh boulders, sometimes of large size, in various localities, far from land, on muddy bottoms, off the coasts of Maine and Nova Scotia, where they have doubtless been recently dropped from shore ice.

† *Hyalinæcia artifex* Verrill, sp. nov. Closely related to *H. tubicola* of Europe, but much larger, with the buccal segment as long as the three or four following segments; anterior antennæ small, short, rounded, ovate; three median ones subequal, very long, reaching the 15th segment; eyes rudimentary; branchiæ slender, commencing at about the 28th to 30th segment; bidentate setæ with the hook terminal and less curved. Surface opalescent.



larger end, but taper gradually toward the smaller one, and are nearly straight. They may possibly at times stand erect in the mud, but this is doubtful; in most cases they probably lie free on its surface, and the large and powerful annelid inhabiting them probably has the power of dragging them about; otherwise it would be impossible to account for the numerous hydroids, actinians, sponges, &c., which often cover them.

On the harder bottoms, in the shallower localities, especially at stations 865 to 867, we obtained great quantities of a very different, unattached worm-tube, composed of bivalve shells, entire and broken, arranged so as to form a strong, flattened covering around a thin silken, central tube. These are made by a pale, opalescent species of *Nothria* (near *N. conchylega*), allied to *Hyalinaccia*. In the localities last named we also took large quantities of another very different kind of worm-tube, made by another Annelid of the same family, a large species of *Eunice* or *Leodice*.\* This tube is sometimes half an inch in diameter, more or less attached, irregularly bent, often branched, or with side-openings at the angles. It is composed of a parchment-like material, and is usually covered with hydroids, sponges, actinians, ascidians, &c.

The sand and mud usually contain a large percentage of calcareous Foraminifera, many of which are remarkably large and handsome species, often more than 5<sup>m</sup> or 6<sup>m</sup> in diameter. In some of the localities (as at stations 869, 894, and 895) there were, in the mud, very large quantities of large sand-covered Rhizopods (*Astrorhiza*, *Rhabdammina*, &c.), which assume a variety of irregularly branched and often rudely stellate forms, but many of them are rod-like, and nearly an inch in length.

Fishes, Crustacea, Annelids, Anthozoa, and Echinoderms, as well as Mollusca, abounded in new and strange forms. Of many of these species, previously unknown in our waters, thousands of specimens were obtained. At several of the stations, especially at 880, 881, 893, and 894, large numbers of the handsome Mopsea-like coral, *Acanella Normani* V., were taken; to these many fine specimens of the rare *Pecten vitreus* were attached, and also several species of Actinians and Annelids. In many of the localities vast numbers of hermit-crabs (*Paguridae*), of several species, occurred, inhabiting cases consisting of groups of the compound, sand-coated Actinians, mostly *Epizoanthus Americanus* V. The bases of these originally covered dead shells of Gastropods or Pteropods, occupied by the crabs, but by some chemical process they have, in most cases, wholly removed the substance of the shell, so that the polyp constitutes the entire residence of the crab. Large numbers of huge Actinians, such as *Bolocera Tuedia*, *Urticina nodosa*, &c., oc-

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\* *Leodice polybranchia* Verrill, sp. nov. A stout species, resembling *L. virida* (St.) = *L. Norvegica* (L.), but the branchiæ commence on the seventh or eighth segment, and continue to near the end of the body, on at least 120 segments; they have four to six branches; eyes large, round; three median antennæ, long, the middle one longest; tentacles long, reaching beyond the edge of the buccal segment, which is as long as the three following ones; ventral cirri at first conical, those beyond the fourth, short, with large swollen bases.

enured in most of the deeper dredgings. Large quantities of a large, handsome, but very fragile, cup-coral (*Flabellum Goodei* V.) occurred in the deeper localities, especially at stations 880, 894, 895, but most of the specimens were ruined by being crushed by the great weight of the contents of the trawl. The animal of this coral is bright orange, with a purple center.

While many of the species of every class obtained here are arctic, or belong to the cold waters found at similar or greater depths on the coasts of Europe and in the Mediterranean, a few genera, like *Aricula*, *Solarium*, and *Marginella*, are related to southern or West Indian forms. A number of the most abundant species of Crustacea and Echinoderms\* had already been described from the collections made by Pourtales, off Florida.

Many free-swimming species, belonging to the Pteropoda and Heteropoda, of which we dredged the dead but perfectly fresh shells, were not previously known to occur so far north. They were associated with others of the same groups which had previously been taken living at the surface along our shores, but they all belong properly to the Gulf Stream fauna.

The frequent occurrence of nearly fresh shells of *Argonauta Argo* was also a matter of surprise to us, and indicates that this species must often be very common near our coast.

The very large collections of specimens obtained on these three trips have, as yet, been only partially examined, but enough has already been done to prove this region to be altogether the richest and most remarkable dredging ground ever discovered on our coast. The large number of new forms, combined with others previously known only from remote regions, constitute a very distinct fauna, hitherto almost wholly unknown.

A considerable number of undetermined, and perhaps undescribed, shells from these localities are not included in this article.

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\* A brief account of the Echinoderms obtained by us, with descriptions of several of the new species discovered, has been published by me in the American Journal of Science for November, 1880.

It is only necessary to say here that several of the star-fishes, Ophiurans, and Crinoids occurred in such large numbers as to constitute one of the most conspicuous features of the fauna. The most abundant species were *Archaster Americanus* V., *A. Agassizii* V., *A. Flora* V., *Luidia elegans* Perrier, *Ophiocnida olivacea* Lym., *Ophioscolex glacialis* M. & Tr., *Ophioglypha Sarsii* Lym., *Antedon Sarsii* (D. & Koren).

All these species, except the last two, are orange-colored, varying to orange-red. The same is true of *Acanella Normani*, of most of the Actinians, and of the majority of the crabs and shrimps, as well as of some of the fishes. It seems probable that the prevalence of orange and red colors among the deep-water animals is due to the fact that the luminous rays of those colors are completely absorbed by the thick, overlying stratum of sea-water, and consequently these animals, not being capable of reflecting such bluish and greenish rays as do reach them, would be nearly invisible at those depths beyond which white light penetrates. If this be true, such colors, being protective, may be due to the operation of natural selection, according to the principle so often exemplified in shallow-water animals having colors like their surroundings.

*Dredging stations on the outer bank in 1880.*

Number.	Locality.						Depth.	Nature of bottom.		
	Latitude.			Longitude.			Fathoms.			
	°	'	"	°	'	"				
865.....	40	05	00	N.	70	23	00	W.	65	Fine compact sand, with some mud.
866.....	40	05	18	N.	70	22	18	W.	65	Do.
867.....	40	05	42	N.	70	22	06	W.	64	Do.
868.....	40	01	42	N.	70	22	30	W.	162	Do.
869.....	40	02	18	N.	70	23	06	W.	192	Mud and fine sand, soft.
870.....	40	02	36	N.	70	22	58	W.	155	Fine sand, with some mud.
871.....	40	02	54	N.	70	23	40	W.	115	Do.
872.....	40	05	39	N.	70	23	52	W.	86	Shells and sponges.
873.....	40	02	00	N.	70	57	00	W.	100	Fine sand and mud.
874.....	40	00	00	N.	70	57	00	W.	85	Do.
875.....	39	57	00	N.	70	57	30	W.	126	Do.
876.....	39	57	00	N.	70	56	00	W.	120	Do.
877.....	39	56	00	N.	70	54	18	W.	126	Do.
878.....	39	55	00	N.	70	54	15	W.	142½	Do.
879.....	39	49	30	N.	70	54	00	W.	225	Do.
880.....	39	48	30	N.	70	54	00	W.	252	Mud and fine sand.
881.....	39	46	30	N.	70	54	00	W.	325	Mud. Trawl partially fouled.
891.....	39	46	00	N.	71	10	00	W.	± 500	Mud and fine sand.
892.....	39	46	00	N.	71	05	00	W.	487	Mud, fine sand, small stones.
893.....	39	52	20	N.	70	58	00	W.	372	Do.
894.....	39	53	00	N.	70	58	30	W.	365	Do.
895.....	39	56	30	N.	70	59	45	W.	238	Do.

The temperature determinations, owing to the violent motions of the steamer, are unreliable at stations 865 to 872. At stations 873 to 878 the bottom temperature was usually 51° to 53° F.; at 879 to 881 it was 42° to 43° F.; at 893 and 894, it was 40°.

## CEPHALOPODA.

The great abundance of Cephalopods in the deep-water localities explored by us is a very interesting and important discovery. Eight species were taken this season. Some of these occurred in large numbers. This collection adds three genera to the New England fauna, two of them new and very curious.

*Heteroteuthis tenera* Verrill.

Amer. Journ. Science, xx, p. 392, for Nov., 1880 (published Oct. 25).

A small and delicate species, very soft and translucent when living. Body shortish, cylindrical, scarcely twice as long as broad, posteriorly usually round, but in strongly contracted, preserved specimens often narrowed and even obtusely pointed; front edge of mantle with a dorsal angle extending somewhat forward over the neck. Fins very large, thin, longer than broad; the outer edge broadly rounded; the anterior edge extending forward quite as far as the edge of the mantle and considerably beyond the insertion of the fin, which is itself placed well forward. The length of the fin is about two-thirds that of the body; the base or insertion of the fin is equal to about one-half the body length; the breadth of the fin is greater than one-half the breadth of the body. Head large, rounded, with large and prominent eyes; lower eye-lid slightly thickened. Arms rather small, unequal, the dorsal ones considerably shorter and smaller than the others. In the male the left dorsal arm is

greatly modified and very different from its mate. Lateral and ventral arms subequal. In both sexes, and even in the young, the suckers along the middle of the four lateral and two ventral arms are distinctly larger than the rest, but in the larger males this disparity becomes very remarkable, the middle suckers becoming greatly enlarged and swollen, so that eight to ten of the largest are often six or eight times as broad as the proximal and distal ones; they are deep, laterally attached, with a raised band around the middle and a very small, round aperture, furnished with a smooth rim. In the female the corresponding suckers are about twice as broad as the rest on the lateral arms. The suckers are in two regular rows on the lateral and ventral arms, in both sexes. In the male the left dorsal arm becomes thickened and larger from front to back, and usually is curled backward; its suckers become smaller and much more numerous than on the right arm, being arranged in four crowded rows, except near the base, where there are but two; the sucker-stalks also become stout and cylindrical or tapered, their diameter equaling that of the suckers. The right arm remains normal, with two alternating rows of suckers, regularly decreasing to the tip, as in both the dorsal arms of the female. Tentacular arms long, slender, extensible; club distinctly enlarged, usually curled in preserved examples. The suckers on the club are numerous, unequal, arranged in about eight close rows; those forming the two or three rows next the upper margin are much larger than the rest, being three or four times as broad, and have denticulated rims. Color, in life, pale and translucent, with scattered chromatophores. In the alcoholic specimens the general color of body, head, and arms is reddish, thickly spotted with rather large chromatophores, which also exist on the inner surface of the arms, between the suckers, and to some extent on the tentacular arms and bases of the fins; outer part of fins translucent white; anterior edge of mantle with a white border. Length of body 25<sup>mm</sup> to 40<sup>mm</sup>. Pen small and very thin, soft and delicate. It is angularly pointed or pen-shaped anteriorly, the shaft narrowing backward; a thin, lanceolate expansion or web extends along nearly the posterior half. Upper jaw with a strongly incurved, sharp beak, without a notch at its base. Lower jaw with the tip of the beak strongly incurved, and with a broad but prominent rounded lobe on the middle of its cutting edges.

Odontophore with simple, acute-triangular, median teeth; inner laterals simple, nearly of the same size and shape as the median, except at base; outer laterals much longer, strongly curved forward.

Over 150 specimens of this interesting species were secured by the writer and others of the dredging party on the United States Fish Commission steamer "Fish Hawk," September 4, 1880. It was particularly abundant at stations 870 and 871, in about 125 to 150 fathoms, on the rapidly sloping outer bank of the coast, under the inner edge of the Gulf Stream. Both sexes occurred in about equal numbers, and also the young, of various sizes. It was also taken in considerable numbers



at stations 865 to 867, in 65 fathoms; 872 to 880, in 86 to 252 fathoms. It was also obtained by Mr. A. Agassiz, at similar depths, in the same region, as well as farther south, earlier in the season, while dredging on the Coast Survey steamer "Blake".

This species was associated, at station 869, in 192 fathoms, mud, with *Octopus Bairdii* and *Rossia subleris*. It can easily be distinguished from the latter and other species of *Rossia*, not only by the large suckers of the lateral arms, but still better by the inequality of the suckers on the tentacular club. The latter character is obvious in specimens of both sexes and of all ages.

**Gonatus amœnus** (Möller) Gray.

G. O. Sars, *Mollusca Regionis Arcticæ Norvegiæ*, p. 336, pl. 31; pl. xvii, fig. 2 (figures excellent).

A good specimen of this species, in nearly perfect preservation, was recently presented to the United States Fish Commission by Capt. William Demsey and crew, of the schooner "Clara F. Friend". It was taken from the stomach of a cod, off Seal Island, Nova Scotia.

**Calliteuthis Verrill.**

Amer. Journ. Sci., xx, p. 393, for Nov., 1880 (published Oct. 25).

Form much as in *Histioteuthis*, but without any web between the arms. Body short, tapering to a small free tip; fins small, united behind the tip of the body. Siphon united to the head by two dorsal bands; an internal valve. Mantle connected to the sides of the siphon by lateral elongated cartilages and corresponding grooves on the sides of the siphon. Arms long, free; suckers in two rows, largest on the middle of the lateral and dorsal arms. Eyes large, with oval openings. Buccal membrane simple, sack-like.

**Calliteuthis reversa** Verrill.

Loc. cit., p. 393.

Arms long, tapering, the lateral pairs equal; the dorsal and ventral about equal, somewhat shorter than laterals; tentacular arms slender, compressed (the ends absent). Fins small, thin, transversely rhomboidal, white. Color reddish brown. The ventral surface of the body, head, and arms is more ornamented than the dorsal surface, being covered with large, rounded verrucæ, their center or anterior half pale, the border or posterior half dark purplish brown; upper surface of body with much fewer and smaller scattered verrucæ; a circle of the same around the eyes; inner surfaces of arms and buccal membranes chocolate-brown. Total length, 133<sup>mm</sup>; to base of arms, 67<sup>mm</sup>; mantle, 51<sup>mm</sup>; of fin, 17<sup>mm</sup>; breadth of fins, 24<sup>mm</sup>; of body, 20<sup>mm</sup>; diameter of eye-ball, 16<sup>mm</sup>.

Station 894, 365 fathoms.

**Alloposus** Verrill.

Amer. Journ. Sci., xx, p. 393 (published Oct., 1880).

Allied to *Philonexis* and *Tremoctopus*. Body thick and soft, smooth; arms all (in the male only seven) united by a web extending nearly to



the ends, the length of the arms decreasing from the dorsal to the ventral ones; suckers sessile, simple, in two rows; mantle united firmly to the head by a broad dorsal band and by a ventral and two lateral *commis-sures*, the former placed in the median line, at the base of the siphon; free end of the siphon short, well forward. In the male the right arm of the third pair is hectocotylized and developed in a sack in front of the right eye; as found in the sack it is curled up and has two rows of suckers; the groove along its edge is fringed; near the end the groove connects with a rounded, obliquely placed, lateral, concave lobe, with interior plications. The terminal portion of the arm is a lanceolate thickened process, with ridges on the inner surface.

The permanent attachment of the mantle and neck, by means of commissures, is a very distinctive character.

***Alloposus mollis* Verrill.**

Loc. cit., p. 394.

Body stout, ovate, very soft and flabby. Head large, as broad as the body; eyes large, their openings small. Arms rather stout, not very long, webbed nearly to the ends, the dorsal 60<sup>mm</sup> longer than the ventral arms; suckers large, simple, in two alternating rows. Color deep purplish brown, with a more or less distinctly spotted appearance. Length, total, 160<sup>mm</sup>; of body to base of arms, 90<sup>mm</sup>; of mantle, beneath, 50<sup>mm</sup>; of dorsal arms, 70<sup>mm</sup>; breadth of body, 70<sup>mm</sup>. Seven specimens were taken. The sexes scarcely differ in size. Station 880, in 225 fathoms (2 ♂, 1 ♀); 892, 487 fathoms; 893, 372 fathoms; 895, 238 fathoms.

***Argonauta Argo* Linné.**

The capture of a living specimen, probably of this species, on the coast of New Jersey, has been recorded by Rev. Samuel Lockwood.\* It was, nevertheless, very surprising to us to find its shells, or fragments of them, very common in nearly all our deeper dredgings, 70 to 100 miles off the southern coast of New England. At station 894 two entire and nearly fresh shells were taken, and another nearly complete. They belong to the common Mediterranean variety.

## GASTROPODA.

***Bela* (Leach) H. & A. Adams; G. O. Sars, &c.**

*Pleurotoma* (pars) Jeffreys and many earlier authors.

The species of this genus are numerous on our coast, but their identification is difficult, owing to the very poor and insufficient descriptions of many European writers.† Möller's Greenland species, especially, are

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\*Amer. Naturalist, xi, p. 243, 1877.

†In Binney's edition of Gould's Invert. of Mass. there are included seven northern species of *Bela*. Of these the figures are mostly inadequate, and some are entirely erroneous. Fig. 620, given for *B. turricula*; Fig. 621, intended for *B. harpularia*; and Fig. 624, for *B. cancellata*, do not really represent those species. Fig. 620 represents *B. harpularia* better than "*B. turricula*", for which it was intended.

badly described. The publication of the excellent work of G. O. Sars has at length rendered it possible to identify many species, hitherto doubtful, with his Norwegian forms, though there may still be doubt as to the proper application of the names given by earlier writers, and even as to the actual specific distinctness of all the forms that he has described. The sexual variations he has not taken into account. During numerous dredging expeditions made in the past twenty years, the writer has obtained a large series of specimens of *Bela*, which he has reserved for a more complete revision hereafter; but some of the more conspicuous forms not yet recorded from New England, and in part not known as American species, are here mentioned. Figures of all these and others have been engraved for a more detailed paper and will, it is hoped, soon be published.

*Bela Pingelii* (Möller, 1842) H. & A. Adams, i, p. 92, 1858.

G. O. Sars, Moll. Reg. Arct. Norv., p. 2-3, pl. 16, fig. 5, 1878.

This very distinct species has been repeatedly dredged by me at Eastport, Me., and by the United States Fish Commission parties in Casco Bay, Massachusetts Bay, on George's Bank, and off Nova Scotia. It has not unfrequently been confounded by authors with *B. cancellata*. It is our most slender and elongated species, with evenly rounded whorls, strongly cancellated, over the whole surface, by numerous slender, longitudinal ribs and revolving raised lines or cinguli, which are about equally prominent, and form small, round nodules where they cross the ribs.

*Bela Sarsii* Verrill, sp. nov.

*Bela cancellata* G. O. Sars, op. cit., p. 224, pl. 23, fig. 31; pl. viii, fig. 9 (not of Couthouy).

This name is proposed for the species described and figured by G. O. Sars as *B. cancellata*. The same species was formerly collected by Dr. A. S. Packard at Labrador, and sent to us by him under the name of *B. exarata*. It is a small, strongly sculptured species, with obtuse, angular-shouldered whorls, and is especially distinguished by its few broad and strong ribs, crossed by rather distant revolving lines, giving it a coarsely cancellated surface.

*Bela cancellata* (Mighels) Stimpson, Check List.

*Fusus cancellatus* Mighels, Proc. Boston Soc. Nat. Hist., i, p. 50, 1841; Boston Journ. Nat. Hist., iv, p. 52, pl. 4, fig. 18, Jan., 1842.

*Bela cancellata* Gould, Invert. Mass., ed. ii, p. 355, description (not the figure, 624).

The true *Bela cancellata* (Mighels) is a common shell on the New England coast, in 20 to 60 fathoms. It is an elongated species, with long, acute spire, and with the whorls moderately and obtusely shouldered at some distance below the suture, the flattened portion above the shoulder being destitute of revolving lines, but crossed by the numerous oblique ribs, which are strongly bent at the shoulder and take a sigmoid form.

Below the shoulder the cinguli are numerous and prominent, crossing the prominent narrow ribs so as to produce a distinct, but not coarse, cancellation. It most resembles the figures of *B. elegans* and *B. angulosa* of Sars. It is perhaps the original *B. declivis* (Lovén), but does not agree with Sars's figure.

***Bela tenuicostata* M. Sars.**

G. O. Sars, op. cit., p. 237, pl. 17, figs. 1 *a*, *b*; pl. ix, fig. 6 (dentition).

Specimens apparently identical with this species were dredged by me, in moderate depths, at Eastport, Me., in 1864, 1868, and 1870. It was also taken this season at stations 893 and 894, in 365 to 372 fathoms. It is closely related to *B. decussata* Couth., but has smaller and more numerous ribs, and is, therefore, more finely cancellated. It may be only a variety of *B. decussata*. The latter is easily distinguished from all our other species by its oval form, rounded, scarcely shouldered whorls, crossed by very numerous small, narrow, flexuous, sigmoid ribs, which are strongly bent backward near the suture, in conformity with the very distinct, rounded sinus of the lip. The whole surface, except close to the deep suture, is covered with numerous rather fine, close, raised, revolving cinguli, giving the surface a rather finely and regularly cancellated structure.

***Bela Trevelyana* (Turton) H. & A. Adams.**

This has been recorded by Jeffreys from the Gulf of Saint Lawrence. He formerly united *B. decussata* with it, but has subsequently (in *Mollusca of Valorous Expedition*) distinguished them. I have myself seen no American shells agreeing clearly with English specimens of *B. Trevelyana*. The latter resembles *B. decussata* in form and size, but has the ribs nearly straight and the cancellation coarser than in our shell.

***Bela impressa* ? (Beck) Mörch, Catal. Moll. Spitzberg, p. 17, 1869.**

*Pleurotoma impressa* Leche, Kongl. Svenska Vet.-Akad. Handl., Bd. 16, p. 54, pl. 1, fig. 16, 1878 (author's separate copy).

I refer doubtfully to this species a small but very distinct shell frequently dredged by us, in 10 to 70 fathoms, all along the coast, from off Cape Cod to Nova Scotia. It was also dredged this season at stations 812 to 815, in 27 fathoms, off Block Island.

The shell is greenish white, short-oval, with about five whorls, which are distinctly flattened and angularly shouldered near the deep suture. There are on the last whorl about twenty rather broad, flat ribs, which are a little prominent and usually slightly nodose at the shoulder, but they disappear a short distance below. The most characteristic feature is that the surface is marked by rather fine, but regular and distinct, revolving *grooves* or *sulci*, which are rather distant, with flat intervals. Of these there are usually about three or four on the penultimate whorl, and about twenty on the last, the greater number being below the middle, on the siphon, where they become closer; one of the sulci, just below

the shoulder, is more distinct, and crosses the ribs so as to give their upper ends a subnodulous appearance; below this there is usually a rather wide, smooth zone; no revolving lines above the shoulder. Aperture about half the length of the shell, rather wide, angular; canal short. There is a very distinct, moderately deep, posterior sinus; the middle of the outer lip projects forward strongly. Ordinary specimens are about 6.5<sup>mm</sup> long; 3.5<sup>mm</sup> broad; aperture, .3<sup>mm</sup> long.

Our shell is not so stout as that represented in the figure of Leche, but it agrees very well in other respects.

***Bela exarata*** (Möller) H. & A. Ad., Genera, i, p. 92, 1858.

G. O. Sars, op. cit., p. 232, pl. 16, fig. 18; pl. ix, figs. 1 a, b (dentition, &c.).—

Verrill, Trans. Conn. Acad., v, pl. 43, fig. 15.

A regularly cancellated species of *Bela*, agreeing with Greenland specimens sent under this name from the University Museum of Copenhagen, is not uncommon, ranging from off Massachusetts Bay to the Bay of Fundy and Nova Scotia. It does not agree perfectly, however, with G. O. Sars's figure of the shell, but its dentition agrees well with his figure and seems to be characteristic. The color of the shell is usually pale greenish or greenish white; texture thin; size medium; whorls turreted, flattened, angularly shouldered close to the suture, with the angle of the shoulder rather sharply nodose. Ribs numerous, regular, nearly straight, narrow but rounded, separated by concave intervals of equal or greater width. Whole surface covered with regular and rather strong, elevated, revolving cinguli, which cross the ribs and produce on them small, rounded nodes, and give a very regularly and strongly cancellated appearance to the whole surface. On the penultimate whorl there are about four cinguli below the angle. The flattened space above the shoulder is crossed by the ribs and covered with numerous fine revolving lines. Length, 10<sup>mm</sup>; breadth, 4.5<sup>mm</sup>; length of aperture, 5.5<sup>mm</sup>. A more elongated form, similar to the above, but with the angle of the whorls still more sharply nodose, also frequently occurs. This I have supposed to be the male of the same species, but it agrees closely with Sars's figure of *Bela mitrula* (Lovén). The dentition of *B. exarata* closely resembles that of the latter, as figured by Sars. The teeth are unusually long and large for the size of the shell, rather slender, somewhat curved, acute, with one side excavated to near the tip; basal part short, a little thickened, notched deeply on one side, obtuse.

Living specimens were also dredged this year at stations 880, 892, and 894, in 252 to 487 fathoms.

***Bela rugulata*** (Möller) H. & A. Ad., Genera, i, p. 92, 1858.

G. O. Sars, op. cit., p. 230, pl. 23, fig. 6; pl. viii, figs. 13 a-c (dentition).

This is one of the several species that have commonly been confounded under the name of "*Bela turricula*".

Our shell agrees well with the figures and description given by G. O. Sars, both as to its external characters and dentition. The sculpture



is rather coarse, the ribs being strong, with wider and concave intervals; the whorls are strongly angularly shouldered, each of the ribs ending in a distinct nodule, formed by the first spiral groove below the shoulder, which is stronger than the rest; the flattened subsutural area is nearly or quite destitute of spiral lines, but is crossed by slight flexuous extensions of the ribs; the whole surface below the shoulder is covered with strong spiral lines, between the ribs. On the upper whorls a few of the revolving lines are stronger than the rest, forming with the ribs a coarsely cancellated structure.

The dentition is very characteristic, and entirely different from *B. exarata*, *B. harpularia*, and other allied forms. The uncini are broad, flat, lanceolate, with a sharp, slightly barbed tip, and with a broad bilobed base.

This species has frequently been dredged by us in Massachusetts Bay, Bay of Fundy, &c., in 5 to 50 fathoms.

***Bela simplex*** (Middend.).

G. O. Sars, Moll. Reg. Arct. Norv., p. 239, pl. 17, fig. 4; pl. 23, fig. 11; pl. ix, fig. 9 (dentition).

*Bela laevigata* Dall (teste G. O. Sars).

One dead, but fresh, small specimen, from station 894. The whorls are very convex and evenly rounded, nearly smooth, but covered with fine and close spiral lines, crossed by still finer lines of growth; subsutural zone smooth. The apex of the spire is acute. The three apical whorls are chestnut-brown; their surface is finely decussated by equal lines running in opposite directions.

***Bela hebes*** Verrill, sp. nov.

Shell short-fusiform or subovate, with a short, blunt spire and five well-rounded, slightly turreted whorls: suture impressed. Sculpture numerous small, regular, raised, spiral ridges, with wider interspaces, those just below the suture stronger and more distant; lines of growth faint. Aperture narrow-ovate. Outer lip expanded below the suture, then regularly rounded, thin; the posterior sinus is broad and shallow; canal short and broad, straight; columella regularly incurved. Epidermis thin, greenish white. Length, 8<sup>mm</sup>; breadth, 5<sup>mm</sup>; length of aperture, 5<sup>mm</sup>; its breadth, 1.80<sup>mm</sup>; length of body-whorl, front side, 6.35<sup>mm</sup>.

Stations 891 and 892, in 500 and 487 fathoms; four specimens.

***Pleurotoma (Pleurotomella) Agassizii*** Verrill & Smith.

Amer. Journ. Sci., xx, p. 394, for Nov., 1880 (published Oct. 25).

This large and elegantly sculptured species occurred sparingly, living, in many of the off-shore localities (869, 871, 874, 877, 880), in 65 to 252 fathoms, but it was taken in larger numbers at stations 891 to 895, in 238 to 500 fathoms. The two nuclear whorls are very small, chestnut-brown, scarcely carinated, rounded, with the surface finely cancellated by lines running obliquely, in two directions, but close to the suture only the transverse lines appear.



**Pleurotoma (Pleurotomella) Pandionis** Verrill, sp. nov.

Shell large, thick, dull brownish yellow, with a very acute, elevated spire; whorls nine, very oblique, moderately convex, concave below the suture; whole surface covered with close lines of growth, which recede in a broad curve on the subsutural band; numerous fine, unequal, raised, spiral lines cover the whole surface, except the subsutural band. The upper whorls are also crossed by sixteen to eighteen blunt, transverse ribs, about as broad as their interspaces, most elevated on the middle of the whorls, fading out above and below. Aperture elongated, narrow; sinus broad and well marked, just below the suture; canal short, nearly straight. Operculum absent. Length, 43<sup>mm</sup>; breadth, 14.5<sup>mm</sup>; length of aperture, 19<sup>mm</sup>; its breadth, 5.5<sup>mm</sup>.

A large specimen was taken alive at station 895, in 238 fathoms.

**Pleurotoma Carpenteri** Verrill & Smith.

Amer. Journ. Sci., xx, p. 395 (published Oct., 1880).

Only a few specimens were taken, stations 871 to 873, in 86 to 115 fathoms.

This species very likely belongs to *Mangelia*, but I have had for examination no specimens with the animal.

**Taranis Morchii** ? (Malm) Jeffreys, Annals and Mag., v, 1870.

G. O. Sars, Moll. Reg. Aret. Norv., p. 220, pl. 17, fig. 8.

Two good examples of a prettily sculptured shell, which I refer doubtfully to this species, were taken at station 894, in 365 fathoms, off Newport, R. I. They do not agree fully with Sars's figure and description.

Whorls six, the lower ones sharply angulated and carinated. There are five revolving, nodulous carinæ on the body-whorl, one close to the suture; the second and most prominent surrounds the periphery; the other three are on the anterior half; some faint additional ones appear on the canal; the three preceding whorls have the subsutural and the sharp central carina, and usually the third carina is more or less exposed at the suture. Between the first and second carinæ the surface is flat or slightly concave. The whorls are crossed by numerous thin, delicate, flexuous, regularly spaced, raised ribs, which are conspicuous between the carinæ, and produce sharp nodules where they cross them. The nucleus is small, rounded, light chestnut-brown, minutely cancellated with microscopic lines running in two directions. Sinus of the lip shallow, rounded. Length, 4<sup>mm</sup>; breadth, 2<sup>mm</sup>.

The principal difference between our specimens and the form figured by Sars is that in the latter there are more carinæ, two of which surround the periphery, instead of one.

**Taranis pulchella** Verrill, sp. nov.

A smaller and more slender species than the preceding, with a more acute spire, and with the carinæ sharp, but not nodulous. Whorls seven, angular, the lower ones carinated and shouldered. Body-whorl

with six revolving carinæ, besides one or two on the canal; one is just below the suture; the three largest surround the periphery, the median one most prominent. Between the subsutural and second carinæ the surface is concave and crossed by numerous elevated, thin, curved riblets, corresponding to the labial sinus; similar but less prominent and less curved riblets cross the interspaces between the other carinæ, but do not cross the carinæ themselves. Penultimate whorl with the subsutural and two peripheral carinæ. Preceding whorls without distinct carinæ, except the subsutural one, but with the curved, transverse, raised riblets well developed. Nuclear whorls very small (surface eroded). Aperture narrow, angular; canal short, slightly turned to the left; outer lip with a distinct, evenly rounded sinus below the subsutural carina. Columella slightly incurved and flattened. Length, 2.20<sup>mm</sup>; breadth, .90<sup>mm</sup>; length of body-whorl, 1.40<sup>mm</sup>; of aperture, .95<sup>mm</sup>.

Station 892, in 487 fathoms; one specimen.

**Marginella roscida** (?) Ravenel.

A single dead specimen, closely resembling this species, was taken at station 865, in 65 fathoms.

**Tritonofusus latericeus** (Möll.) Mörch.

*Sipho latericeus* G. O. Sars, Moll. Reg. Aret. Norv., p. 276, pl. 15, fig. 8; pl. x, fig. 24 (dentition).

Several specimens, apparently of this species, were taken at stations 894 and 895, in 238 to 365 fathoms, off Newport. It had previously been dredged in the Gulf of Saint Lawrence by Dr. J. W. Dawson.

Our shell is long-fusiform, with an elevated, acute spire; whorls eight, moderately convex, crossed by strong, prominent, rounded ribs (about eighteen on the last whorl), separated by concave interstices, wider than the ribs; whole surface covered with fine and regular spiral grooves, defining raised spiral lines of about double their width; these lines cross the ribs as well as their interspaces. Nuclear whorl small, a little eccentric and incurved. Aperture long-ovate, narrow. Canal somewhat elongated, nearly straight, narrow; the outer lip is contracted or incurved at its base. Length, 20<sup>mm</sup>; breadth, 8<sup>mm</sup>; length of aperture, 10<sup>mm</sup>; its breadth, 3<sup>mm</sup>.

**Neptunea** (*Sipho*) *cælata* Verrill, sp. nov.

Shell resembling the last, small, subfusiform, with an elevated spire, which is less acute than in the preceding, while the aperture is shorter and the canal is shorter and more recurved than in that species. Whorls six, moderately convex, with impressed sutures, the upper whorls decreasing more rapidly. Nuclear whorls very small, regular, smooth, not distinctly incurved. Sculpture broad, rather prominent, rounded ribs, with wider concave interspaces, and over the whole surface numerous small, narrow, unequal, raised spiral lines, separated by wider grooves. The whole surface is also covered with very fine and regular raised lines of growth, which cross and roughen the spiral raised lines, and are more

conspicuous in the grooves, producing a fine decussated structure. On the last whorl are fourteen to sixteen of the transverse ribs or folds; these become obsolete just below the periphery, so that on the base there are only spiral lines and lines of growth. Aperture narrow-ovate. Outer lip evenly rounded in the middle, but contracted at the base of the canal, which is short, rather narrow, and distinctly recurved. Columella decidedly curved. Epidermis thin, yellowish white, closely adherent, with distinct lines of growth. Length, 14.5<sup>mm</sup>; breadth, 7<sup>mm</sup>; length of aperture, with canal, 7<sup>mm</sup>; its breadth, 3<sup>mm</sup>; length of body-whorl, front side, 10<sup>mm</sup>. Stations 891 to 895, 238 to 500 fathoms, with the preceding; several specimens, living.

**Neptunca** (*Sipho*) *arata* Verrill, sp. nov.

Stations 869 to 880, 893 to 895; common. Nearly all our deep-water specimens related to *N. Stimpsoni* Mörch (= *Fusus Islandicus* Gould) differ widely from the common shallow-water form, in having the whole surface much more strongly sulcated by broader, deeper, and less numerous spiral grooves. On the upper whorls there are seven or eight of these broad grooves, separating flattened spiral ridges of about the same width; on the last whorls the ridges become broader, and each of them is divided at summit by a smaller secondary groove. The canal is rather long, slightly recurved. Columella twisted, but not much bent. Epidermis not pilose, yellowish brown, often in raised lines along the lines of growth. Color within aperture bluish white, the columella and canal tinged with flesh-color or pale salmon. Length, 80<sup>mm</sup>; breadth, 30<sup>mm</sup>; length of aperture, with canal, 45<sup>mm</sup>; its breadth, 14<sup>mm</sup>.

The typical, nearly smooth variety of *N. Stimpsoni* Mörch is perhaps the same as *N. glabra* Verkrusen, sp. (= *Sipho glaber* G. O. Sars).

**Neptunca** (*Sipho*) *propinqua* (Alder).

*Fusus propinquus* Alder, Catal. Moll. North. & Durh.; Jeffreys, British Conch., iv, p. 338; v, pl. 83, fig. 3.

*Neptunca propinqua* Verrill, Amer. Journ. Sci., xvi, p. 210, 1878.

This shell was first taken by us, in 1877, off Cape Sable, and off Halifax, Nova Scotia, in 88 to 100 fathoms, where it was common. This season it occurred in abundance, living, and of good size, in most of our outer dredgings, being the most common species of this family, except *N. pygmaea*. It occurred at all the stations from 865 to 874, 876 to 880, 893 to 895, ranging in depth from 65 to 487-fathoms. It was most abundant at 869 to 871, 894 and 895, in 115 to 365 fathoms.

Although it does not agree perfectly with the European specimens of *N. propinqua* that I have had for comparison, I have recorded it under this name, largely in deference to the opinion of Mr. W. H. Dall, who has made a special study of this group, and who has had some of our specimens for comparison.

This shell is somewhat stouter and more ventricose than the ordinary forms of *N. Stimpsoni* and *N. arata*, from which it differs, also, in having

an olive-colored, ciliated epidermis; the canal is shorter and more curved and twisted; the suture is slightly channeled, and the aperture is broader than in either of these species. The sculpture consists of regular, narrow, spiral grooves. The aperture is white.

**Buccinum cyaneum** Brug.; Stimpson.

*Buccinum Grönlandicum* G. O. Sars, op. cit., p. 259, pl. 25, fig. 1; pl. x, fig. 11 *a*, *b* (*nou* Stimpson).

This species was dredged in the summer of 1879, by the "Speedwell", off Cape Cod, in 90 fathoms. It was dredged by us in 1877, off Cape Sable, Nova Scotia, in 80 to 90 fathoms, compact sand, and off Halifax, in 100 fathoms, and has often been brought in from the banks off Nova Scotia by the Gloucester fishermen, but it was not previously actually known from the New England coast.

**Nassa nigrolabra** Verrill, sp. nov.

Shell minute, long-ovate, nearly smooth, pale olive, with the edges of the lips blackish. Whorls five, slightly rounded, with shallow sutures; spire elevated, not very acute. Surface covered with close, regular, microscopic lines of growth, and with less distinct revolving lines; canal with a few minute, distinct, spiral grooves. Aperture short-ovate; canal wide and very short; outer lip rounded, with edge flaring, thickened and revolute, with a row of minute nodules on the inside; inner lip consisting of a broad, smooth, glossy, brownish-black deposit of enamel on the body-whorl and columella; columella nearly straight; no umbilicus. Length, 2.85<sup>mm</sup>; breadth, 1.40<sup>mm</sup>; length of aperture, 1.20<sup>mm</sup>.

Station 870, in 155 fathoms; one specimen. It is referred to *Nassa* only provisionally. The animal is not known.

**Lunatia nana** (Möller).

G. O. Sars, op. cit., p. 159, pl. 21, figs. 16 *a*, *b*; pl. v, fig. 14 (dentition).—Verrill, Proc. Nat. Mus., ii, p. 197, 1879.

In addition to the localities off Cape Cod and on Le Have Bank, previously cited by me, this species has been taken at other localities on our coast. It was taken by Prof. S. I. Smith and myself at Eastport, in 1864; by Prof. H. E. Webster at Seal Cove, Grand Menan, in 1872; by Mr. J. F. Whiteaves in the Gulf of Saint Lawrence; and by our party in 1880, twenty miles south of Block Island, in 28 fathoms.

**Lunatia levicula** Verrill, sp. nov.

Shell light, thin, and rather delicate, broad-ovate; spire moderately elevated, subacute. Whorls five, evenly rounded; suture distinct. Aperture ovate, well rounded below. Outer lip short, sinuous along the edge, the upper portion considerably advancing where it joins the body-whorl. Inner lip partially reflexed over a rather small, deep umbilicus, but not thickened, and forming a mere film on the body-whorl, above the umbilicus. Surface covered with distinct and rather coarse, sinuous lines of growth, parallel with the edge of the lip, and, like it, advancing as they approach the suture. Color (of a dead but fresh



shell) pale brownish yellow; the spire, when worn, and the interior, yellowish brown. Other specimens are white or yellowish white. Length, 32<sup>mm</sup>; breadth, 25<sup>mm</sup>; length of aperture, 27<sup>mm</sup>; its breadth, 15<sup>mm</sup>.

This shell was first dredged by me near Eastport, Me., in 1870. It has since been dredged by the United States Fish Commission parties in Casco Bay, Me., and also off Block Island, stations 812 to 814, in 26 to 28 fathoms. It is still a very rare species. It has some resemblance to *Aerybia flava*, on account of the lightness and thinness of the shell, as well as in form, but the shape of the aperture is different, and there is a distinct umbilicus. The columella is also much less incurved.

***Lamellaria pellucida* Verrill.**

Amer. Journ. Sci., xx, p. 395, for Nov. (published Oct. 25, 1880).

Animal broad-elliptical, well rounded, both anteriorly and posteriorly; back convex or somewhat swollen, smooth, without tubercles; branchial sinus, in anterior edge of mantle, shallow but distinct; tentacles slender, tapered; eyes small, black, on the outer basal portion of the tentacles; foot oblong, well developed, reaching nearly to the posterior end of the mantle when extended. Color of the mantle yellowish brown, blotched irregularly with dark brown; some specimens were paler, others darker brown.

Odontophore long and narrow, with three rows of teeth; central tooth much smaller than the lateral, its basal part oblong, with nearly parallel sides and squarely truncate at the end; tip acute-triangular, strongly curved forward, with a prominent, sharp, median denticle, and a row of four or five much smaller denticles on each side. Lateral teeth very large, strongly incurved, and hollowed out on the concave surface, with both edges serrate; the inner edge has the serrations coarser, not reaching the tip, which is smooth, stout, acute. The basal portion of the lateral teeth is furnished with a broad, sinuous, aliform lobe on the outer edge; the basal end is slightly expanded and obtusely round or subtruncate.

The most important difference between the dentition of this species and that of *L. perspicua* and *L. latens* (Müll.) is in the form of the basal portion of the median teeth; in both the European species this is divided into two divergent lobes, separated by a deep notch.

Shell ovate, with a well-formed spire, very thin and delicate, smooth, lustrous, and transparent. Aperture broad-ovate, much larger than the body of the shell, but not so large and open as in *L. latens*. The interior of the spire cannot be seen in a ventral view, but is visible in an end view from the front. The spire is oblique, somewhat elevated, and slightly pointed, with a minute nucleus. Whorls three, well rounded; sutures impressed. Outer lip very thin, sloping or somewhat flattened posteriorly, somewhat expanded and well rounded anteriorly; inner lip receding in a deep, regular incurvature of the body-whorl, which has a sharp, thin edge that winds spirally into the interior of the spire. Sculp-



ture none, except indistinct lines of growth; surface smooth and shining throughout.

Length of the animal in life about 15<sup>mm</sup> to 20<sup>mm</sup>; length of shell, 12.5<sup>mm</sup>; breadth, 10<sup>mm</sup>.

Stations 870 to 872, south of Martha's Vineyard, in 86 to 155 fathoms, fine sand (16 specimens, living).

The shell of this species, in form, closely resembles that of the European *L. perspicua* (not of Gould), but the differences in the mantle and dentition will clearly separate it. Specimens of both sexes occurred, and they had the same form and color externally.

The "*Lamellaria perspicua*" of Gould was based, in part at least, upon *Marsenina glabra*. A species of *Lamellaria* occurs at Eastport, Me., which may be distinct from the preceding.

***Marsenina prodita* (Lovén) Bergh.**

G. O. Sars, Moll. Reg. Arct. Norv., p. 151, pl. 12, figs. 5 *a-c*; pl. v, figs. 7 *a, b* (dentition).—Verrill, Trans. Conn. Acad., v, pl. 42, figs. 2, 2 *a*.

This species was taken, living, at Eastport, Me., by Prof. S. I. Smith and myself, in 1864 and 1868. It is easily recognized by its comparatively prominent, acute spire, turned to one side, by its obliquely elongated aperture, and by the margin of the outer lip being slightly inflexed near the suture. It has not been previously recorded from the American coast, south of Greenland.

***Marsenina glabra* Verrill.**

*Oxinoë glabra* Couthouy, Boston Journ. Nat. Hist., ii, p. 90, pl. 3, fig. 16, 1838.

*Lamellaria perspicua* (pars) Gould, Binney's ed., p. 337, fig. 607 (?).

*Marsenina micromphala* Bergh.—G. O. Sars, op. cit., p. 151, pl. 21, figs. 10 *a-d*.—Verrill, Trans. Conn. Acad., v, pl. 42, figs. 1, 1 *a*.

This species is not uncommon at Eastport, Me., where I collected it in 1859, 1861, 1863, 1864, 1868, 1870, and 1872. It was dredged last year by our party, on the "Speedwell", off Cape Cod, in 34 fathoms. It has a much smaller and less prominent spire than the preceding, and a more regularly oblong-oval aperture. The shell is smooth, white, thin, and delicate in both species, but more translucent in the present one.

There can be no doubt, from the description and figure, that the *Oxinoë glabra* of Couthouy was a *Marsenina* indistinguishable from this species, which is the commonest of the group on our coast. The *M. micromphala*, well described and figured by Sars, appears to agree perfectly with our form, both in the animal and shell.

Gould appears to have confounded two or more species under his *L. perspicua*. His figure (158) in the first edition does not represent this species; the figure 607 of Binney's edition is different, and may be this shell. As a genuine *Lamellaria*, having its shell entirely inclosed in the mantle, also occurs on our coast, not rarely at Eastport, Me., it is not improbable that Gould may have had its shell among those examined by him. Its identity with *L. perspicua* of Europe is very doubtful, however.

**Marsenina ampla** Verrill, sp. nov.

Trans. Conn. Acad., v, pl. 42, figs. 3, 3a.

Shell broad-oval, white, nearly opaque, fragile, with conspicuous lines of growth, but otherwise smooth; whorls scarcely two; last whorl very large, constituting nearly the entire shell, and nearly concealing the first whorl, which appears only as a minute incurved nucleus, situated in an apical depression. Aperture broad, oblong-oval, showing the interior of the spire to the apex. Outer lip thin, distinctly expanded and slightly shouldered near the suture, somewhat straight along the right and left sides, regularly rounded in front, slightly excurved where it joins the inner lip, which consists of a narrow and thin coating, conformable to the columella surface, but with a distinct, narrow groove, and with the edge slightly raised as a narrow lamina in the umbilical region. The columella-edge is sigmoid and very much incurved in the umbilical region.

Length, 11<sup>mm</sup>; breadth, 8<sup>mm</sup>; depth of last whorl, 5<sup>mm</sup>.

Eastport, Me. Dredged in 1868, by the writer.

**Velutella cryptospira** (Middend.).

G. O. Sars, Moll. Reg. Arct. Norv., p. 149, pl. 21, figs 9 a-c.

A good living example of this shell was taken by us in 1877, off Halifax, Nova Scotia, in 57 fathoms (station 82).

The shell is very thin, translucent, yellowish horn-color, flexible, and but slightly calcified, with no sculpture except fine lines of growth. The spire is small, incurved, and depressed, so that the apical whorl is not visible in a front view. The aperture is elongated. The outer lip expands rather abruptly posteriorly, and is prolonged anteriorly.

Length, 8<sup>mm</sup>; breadth, 5<sup>mm</sup>; length of aperture, 6.5<sup>mm</sup>.

**Trichotropis conica** Möller.

Krøyer's Tidss., iv, p. 85, 1842.—G. O. Sars, op. cit., p. 163, pl. 13, fig. 3.

A single dead, but large and characteristic, specimen of this very distinct species was taken in the Gulf of Maine, off Cape Sable, Nova Scotia, in 75 fathoms, by the United States Fish Commission party, on the "Speedwell", in 1877. It is easily recognized by its conical spire and its flattened base, covered with revolving grooves and ridges. The revolving ribs on the spire are stronger than those on the base, and unequal.

**Rissoa (Cingula) harpa** Verrill, sp. nov.

Shell small, white, translucent, acute-conical, with five very convex, rounded whorls and deeply impressed sutures; body-whorl large; apical whorl very small, smooth, regular. Sculpture very regular, well-raised, rounded, transverse ribs, about twenty-six on the last whorl, separated by spaces rather wider than the ribs; and fine, close, microscopic spiral lines, which cover the interspaces. Aperture nearly circular, slightly effuse in front. Outer lip thin, regularly rounded; inner lip reflexed in the umbilical region, and continued on the body-whorl only

as a thin layer of enamel. Umbilicus a small but distinct chink. Length, 2.75<sup>mm</sup>; breadth, 1.80<sup>mm</sup>. Animal unknown.

Dredged by us off Massachusetts Bay, 1877, station 34, in 160 fathoms; and off Newport, at stations 892 and 894, in 487 and 365 fathoms.

**Cingula turgida** (Jeff.) Verrill.

*Rissoa turgida* Jeffreys.—G. O. Sars, Moll. Reg. Arct. Norv., p. 183, pl. 10, figs. 12 a, b.

A very small, white species, with smooth, rounded whorls and distinct umbilicus. Station 892, in 487 fathoms.

**Cingula Jan-Mayeni** (Friele) Verrill.

*Rissoa Jan-Mayeni* Friele, Nyt. Mag. Naturv., 1877 (auth. cop., p. 4, fig. 4).

*Cingula Jan-Mayeni* Verrill, Amer. Journ. Sci., xvii, p. 311, Apr., 1879.

This species was common at stations 891 to 894, in 238 to 500 fathoms. A single specimen occurred at station 880. It was originally from off Greenland, 70 to 300 fathoms. Whiteaves has dredged it in the Gulf of Saint Lawrence, 200 fathoms, but it had not hitherto been taken on the New England coast.

**Lepetella** Verrill.

Amer. Journ. Sci., xx, p. 396, Nov., 1880.

Shell small, smooth, oval or oblong, limpet-shaped, conical, with a simple subcentral apex, not spiral. Animal much as in *Lepeta*, but with distinct eyes. Odontophore tanioglossate, with seven regular rows of teeth; median tooth a rather broad, thin plate, with incurved, smooth, convex edge, narrower than the base; inner lateral tooth stout, with a broad base and a single incurved, terminal denticle; second lateral tooth larger, with a broader flat base and two terminal incurved denticles; outer laterals smaller, flattened, subtriangular plates.

**Lepetella tubicola** Verrill & Smith.

Loc. cit., p. 396, 1880.

Shell thin, white, smooth, conical, with the apex acute and nearly central; aperture broad-elliptical, oblong, or subcircular, usually more or less warped, owing to its habitat; edge thin and simple. Sculpture none, lines of growth slight, outer surface dull white; inner surface smooth, with the pallial markings faint. Length of largest specimens, 3.75<sup>mm</sup>; breadth, 3<sup>mm</sup>; height, 2<sup>mm</sup>. On inside of old tubes of *Hyalinaccia artifex* V.; twenty-seven were taken from one tube. Stations 869, 192 fathoms, and 894, 365 fathoms.

**Lovenella Whiteavesii** Verrill, loc. cit., p. 396, 1880.

*Cerithiopsis costulatus* Whiteaves (*non* Möller).

A small and elegant species, allied to *L. metula* (Lovén). Elongated, subulate; spire regularly tapering to the acute apex; whorls nine, slightly convex, with a prominent, nodulous, revolving carina below the middle, and a smaller one just below the suture; on the body-whorl another less elevated and scarcely nodose carina revolves in line with

the edge of the lip; below this the base is smooth. Whorls crossed by numerous transverse, curved, elevated, rounded costæ, which are about as wide as their intervals, and in crossing the two upper cingulæ form small rounded nodes at their intersections. Aperture broad; columella much incurved above; canal distinctly excurved and twisted; outer lip with three angles corresponding with the three carinæ. Length, 4.5<sup>mm</sup>; breadth, 1.5<sup>mm</sup>. The largest specimen measures, in length, 6.25<sup>mm</sup>; in breadth, 2<sup>mm</sup>. Stations 891, 892, and 894, in 365 to 500 fathoms; Gulf of Saint Lawrence, 200 fathoms, J. F. Whiteaves.

**Truncatella truncatula** (Drap.).

Jeffrey's British Conch., iv, p. 85, pl. iv, fig. 1.—Verrill, Amer. Journ. Sci., xx, p. 250, Sept., 1880.

This species was found by the writer, living in considerable numbers, and of all ages, among the docks at Newport, R. I., July, 1880. It occurred among decaying sea-weeds thrown up at high-water mark, both among the vegetable matter and on the under sides of stones. It was associated with *Alexia myosotis*, *Assiminea Grayana*, *Anurida maritima*, *Orchestia agilis*, &c.

It may possibly have been introduced in recent times by commerce, like the *Littorina littorea*, now so common on our shores; but if so, it has, like the latter, become thoroughly naturalized. This is the first time that it has been observed on our coast, so far as known to me.

**Solarium boreale** Verrill & Smith, sp. nov.

A small, pretty, pale yellowish brown species, with a strong carina-like, rounded, nodulous rib around the periphery. Height, 2.5<sup>mm</sup>; breadth, 5<sup>mm</sup>.

Two living specimens from station 871, 115 fathoms. The spire is low and flattened; nuclear whorl smooth, obliquely incurved, reddish; body-whorl strongly keeled, triangular; above the keel, flattened, and near it, are about six small spiral ribs, separated by impressed lines; upper surface of whorls also crossed by numerous flexuous, transverse, low ribs, with shorter ones interpolated toward the periphery. Base a little convex, about as much so as the spire; toward the periphery covered with numerous fine spiral lines; also covered with many low ribs radiating from the umbilicus, around which they are nodulous. Aperture triangular, with a notch corresponding to the keel.

**Scalaria Pourtalesii** Verrill & Smith.

Amer. Journ. Sci., xx, p. 395, Nov., 1880.

Three fine specimens, one of them living, from stations 871, 873, and 874, in 85 to 115 fathoms.

**Scalaria**, sp.

An undetermined *Scalaria*, having the sculpture much as in *S. Grönländica*, but more slender in form, was taken at station 873. The spiral lines are very distinct between the ribs, and also extend over them.



**Scalaria Dalliana** Verrill & Smith.

Amer. Journ. Sci., xx, p. 395, Nov., 1880.

Several specimens, living, from stations 869, 870, 871, and 874, in 65 to 155 fathoms.

**Acirsa gracilis** Verrill, sp. nov.

Shell white, with a long, slender, regularly tapered, rather acute spire and deeply impressed sutures. Whorls eight, evenly rounded, all except the last crossed by slightly raised but distinct rounded ribs, separated by wider interspaces; the ribs are most elevated just below the sutures and on the upper whorls. Lower whorls with numerous (eight or more) fine, slightly impressed spiral lines, producing narrow spiral cinguli, of which the lowest on the last whorl is strongest and borders the base of the shell, which is convex and smooth. The spiral lines are absent near the sutures. Mouth round-ovate, slightly effuse in front. Inner lip slightly reflected. No umbilicus.

Stations 873 and 894, in 100 to 365 fathoms.

This species is much more slender than *Acirsa costulata* Migh., sp., 1841 (= *A. borealis* and *A. Eschrichtii* of authors), and its ribs are more regular and distinct. *A. pratonga* Jeffreys has much finer sculpture.

**Aclis Walleri** Jeffreys.

G. O. Sars, Moll. Reg. Arct. Norv., p. 193, pl. 11, fig. 18.

Three living specimens were taken at stations 892 and 894, in 487 and 365 fathoms.

**Aclis striata** Verrill, sp. nov.

Shell small, white, somewhat lustrous, fragile, with moderately elevated spire; whorls six, well rounded, with deep sutures, the last one ventricose. Sculpture numerous fine, close, spiral grooves, covering the whole surface. Aperture simple, ovate. Outer lip thin, with a wide and rather deep sinus below the suture, but projecting strongly forward in the middle, where it is regularly rounded, then recedes somewhat anteriorly, joining the inner lip in an even curve. Inner lip discontinuous, slightly concave and reflected in the umbilical region, where it joins the body-whorl. Umbilicus narrow, but deep. Nuclear whorl small, regular, smooth. Length, 4<sup>mm</sup>; breadth, 2<sup>mm</sup>.

One specimen was dredged by me in the Bay of Fundy, near Eastport, Me., in 1868; another was dredged in deep water off Newport, R. I., this season, by the United States Fish Commission.

This species is provisionally referred to *Aclis* because of its general resemblance to known species of that genus. Both my specimens were dead, and I have, therefore, no means of knowing the structure of the animal. Its regular apical whorl shows that it is not an *Odostomia*. The marked sinus of the outer lip and the distinct umbilicus are features not found in any other shell of our coast of similar size and appearance. Dead and broken specimens might be taken for bleached *Cingula aculeus*,



but the latter has a different aperture, continuous lip, and no umbilicus, and its sculpture is coarser.

**Callicostoma Bairdii** Verrill & Smith.

Amer. Journ. Sci., xx, p. 396, for Nov., 1880 (published Oct. 25).

Stations 865 to 874, in 65 to 192 fathoms; many living specimens. Most common at stations 869 and 871, in 192 and 115 fathoms.

**Margarita regalis** Verrill & Smith.

Amer. Journ. Sci., xx, p. 397, for Nov., 1880 (published Oct. 25).

Stations 870, 871, 880 to 895, from 115 to 500 fathoms. Most abundant at stations 892 to 894, in 365 to 487 fathoms.

**Margarita lamellosa** Verrill & Smith.

Amer. Journ. Sci., xx, p. 397, for Nov., 1880 (published Oct. 25).

Stations 869 and 871, 115 to 192 fathoms. Only two specimens obtained.

**Margarita**, sp. nov.

A small, elevated, conical, nearly smooth, white, and iridescent species, with a small, narrow umbilicus, was dredged by us off Halifax, Nova Scotia, in 1877. The specimen is not now at hand for accurate description.

**Machæroplax bella** (Verk.).

G. O. Sars, op. cit., p. 137, pl. 9, figs. 5 a-c.

An elegant species, allied to *M. varicosa*, but with more elaborate sculpture. As in the latter, the whorls are crossed by oblique, flexuous, rounded, transverse folds, but there are, in addition, in *M. bella* four conspicuous revolving ribs on the last whorl; the upper one is large and nodulous, giving the whorls an angular or somewhat carinated form; the two lower ribs are smaller and close together, the third one at, and the fourth just below the basal angle of the whorl. On the other whorls only the two upper ribs are visible. Base with curved transverse ridges, crossed by fine revolving lines. Umbilicus moderately large and deep, with very distinct spiral lines within it.

Off Cape Sable, Nova Scotia (loc. 47), 90 fathoms, fine, compact sand, United States Fish Commission, 1877. One living and one dead specimen. New to the American coast.

**Cyclostrema trochoides** (Jeff. MSS.) Friele.

Arch. Math. Naturv., 1876, p. 308, pl. 4, figs. 2 a, b—G. O. Sars, op. cit., p. 131, pl. 8, figs. 9 a-c.

A few specimens of this little shell were trawled at stations 892 and 894, in 487 and 365 fathoms. In our specimens the umbilicus is, in most cases, a narrow chink, but in one it is closed. There are distinct spiral lines immediately around the umbilicus. It is new to the American waters.

**Assimineæ Grayana** Leach.

Jeffrey's British Conch., v, p. 99, pl. 4, fig. 1; pl. 97, fig. 5.—Verrill, Amer. Journ. Sci., xx, p. 250, Sept., 1880.

This was found in July of this year, by the writer, living among decaying sea-weeds, at high-water mark, between the docks at Newport, R. I. It was associated with *Alexia myosotis* and *Truncatella truncatula*, and was rather more abundant than either of the latter. Drawings of the animal of this and the two species last named were made by Mr. J. H. Emerton. The animal agrees well with the figures and descriptions of the European examples. It has not been recognized as American before.

**Eulima intermedia** Cantraine.

G. O. Sars, op. cit., p. 210, pl. 11, fig. 20; pl. xviii, fig. 41.

Several living specimens were taken at stations 870, 871, 874, 876, and 877, in 85 to 155 fathoms. It has previously been known from deep water in the Mediterranean, and off the Canary Islands, Lofoden Islands, and Finmark (200 to 300 fathoms).

This shell is more slender than *E. oleacea*. The sutures are not at all impressed; the whorls are flattened so that the spire has a regular, long-conical form. Aperture regularly ovate. The surface is smooth, polished, and shining. Color of shell pure white, translucent; in life the animal shows through, giving it a pale orange or salmon color. Length, 5.6<sup>mm</sup>; breadth, 1.6<sup>mm</sup>.

**Eulima distorta** Deshayes.

G. O. Sars, op. cit., p. 210, pl. 11, fig. 23.

A single living specimen of this curious little shell was obtained at station 871, in 115 fathoms.

**Turbonilla nivea** Stimpson, Check List.

*Chemnitzia nivea* Stimpson, Proc. Boston Soc. Nat. Hist., iv, p. 114, 1851; Invert. Grand Manan, p. 23, 1853.

One perfect specimen of this very rare shell was dredged at station 871, in 115 fathoms.

It is distinguished by its very slender, elongated form, with twelve flattened, closely coiled whorls and slightly marked sutures. The sculpture consists of well-marked, regular, transverse, rounded ribs, with smooth interstices; no spiral lines. Color white; surface shining. Apical whorl small, incurved, and reversed. Length, 6.5<sup>mm</sup>; breadth, 1.5<sup>mm</sup>.

**Turbonilla Rathbuni** Verrill & Smith.

Amer. Journ. Sci., xx, p. 398, Nov., 1880.

Several fine living specimens were taken at stations 865 to 867, in 64 and 65 fathoms, and at stations 893 to 895, in 238 to 365 fathoms.

Dedicated to Mr. Richard Rathbun, of the United States Fish Commission.

**Turbonilla formosa** Verrill & Smith.

Amer. Journ. Sci., xx, p. 398, Nov., 1880.

A few living examples of this elegant shell occurred at stations 891 and 892, in 487 to 500 fathoms.

**Turbonilla Smithii** Verrill, sp. nov.

Shell long and slender, smooth, polished, white, with a narrow spiral band of light yellowish brown or red just above the suture. Whorls up to twelve, much flattened, little oblique, closely coiled, with the sutures only slightly impressed; apical whorl small, incurved. Sculpture none. Aperture irregular oblong-ovate; outer lip nearly straight for about half its length, rounded and slightly prominent anteriorly. Columella lip nearly straight anteriorly, but curved inward and twisted posteriorly, with a slight spiral fold that winds into the shell. Length, 7.5<sup>mm</sup>; breadth, 1.5<sup>mm</sup>.

Stations 871, 873, and 876, in 100 to 120 fathoms.

This elegant and very distinct species I have dedicated to Mr. Sanderson Smith, of the United States Fish Commission party.

**Eulimella ventricosa** (Forbes).

G. O. Sars, op. cit., p. 209, pl. 11, fig. 19; pl. 22, fig. 16.

A single dead specimen, not in good condition, but apparently belonging to this species, was dredged by us at Eastport, Me., in 1868. A perfect specimen was dredged by us this season, at station 873, in 100 fathoms. This last has a distinctly incurved, small, nuclear whorl; whorls nine, smooth, polished, white, well rounded, with deep sutures. Aperture broad-ovate, slightly effuse in front. Outer lip broad, well rounded in the middle and projecting well forward. Length, 3.6<sup>mm</sup>.

**Odostomia unidentata** (Mont.).

G. O. Sars, op. cit., p. 201, pl. 11, figs. 6-8.

*Odostomia modesta* Stimpson.—Gould, Invert. Mass., ed. ii, p. 327, fig. 596.

A single specimen occurred at station 871, in 115 fathoms. This shell appears to be much more rare on the American than on the European coasts.

**Odostomia (Menestho) sulcata** Verrill, sp. nov.

Shell small, white, long-ovate; spire regularly tapered, acute; whorls about six, moderately convex, covered with many regular, rather strong, revolving grooves. Nuclear whorl strongly inflexed and reversed. Aperture regularly ovate. No tooth on the columella. Length, 2.80<sup>mm</sup>; of body-whorl, 1.80<sup>mm</sup>; breadth, 1.40<sup>mm</sup>; length of aperture, 1.10<sup>mm</sup>; its breadth, .70<sup>mm</sup>.

Stations 871 and 894, in 115 and 365 fathoms.

This differs from all other related species of our coast, except *O. striatula* Couth. (= *Menestho albula* Gould, non Fabr.), in being strongly grooved spirally; from the latter it differs in having fewer whorls and a regularly tapered, acute spire, and in having the spiral lines coarser and fewer. Perhaps it is more closely related to the real *Menestho*

*albul* of Greenland, which, according to Jeffreys, is distinct from our shell, so named by Gould. These three forms all belong to *Menestho* Möller (= *Liostomia* G. O. Sars).

*Auriculina insculpta* ? (Mont.).

G. O. Sars, op. cit., p. 204, pl. 11, figs. 11, 12; pl. xviii, fig. 33 (operculum).

A single dead and probably immature specimen, which I refer doubtfully to this species, was taken at station 892, in 487 fathoms. It agrees nearly, in form and sculpture, with the figure (12) given by Sars, but our shell is shorter, ovate-fusiform. There are five slightly convex whorls; the anterior half of the body-whorl is covered with distinct, fine, spiral grooves; nuclear whorl rounded, rather large, partially incurved. Aperture narrow-ovate; a slight fold on the columella; no umbilicus.

*Diaphana* Brown, 1827 (restricted); H. & A. Adams.

*Utriculus* (*pars*) Brown, Ill. Brit. Conch., 1844 (*non* Schumacher, 1817).

*Utriculus* G. O. Sars, Moll. Reg. Arct. Norv., p. 285.

In 1827 Brown proposed the name *Diaphana* for certain species of shells figured by him (but not described), which now are known to belong partly to the restricted modern genus *Utriculus* and partly to *Amphisphyra* Lovén, 1846. But he did not then define the genus, and in a later edition of his work (1844) he discarded the name and substituted *Utriculus* for it.\* But *Utriculus* had been used by Schumacher, in 1817, for a different genus (*Conidae*). Lovén's name (*Amphisphyra*), established by him for Brown's second section of *Utriculus*, should, therefore, be retained for that group, which is a good genus. *Diaphana* and *Utriculus*, as used by Brown, were absolutely synonymous, but *Diaphana*, as used by G. O. Sars, is a synonym of *Amphisphyra*. In its original sense, *Diaphana* might be rejected, because undefined. But since *Utriculus* had been preoccupied, it seems necessary to retain *Diaphana* for the first section of Brown's genus, corresponding nearly with *Utriculus* of G. O. Sars. This is also in accordance with the nomenclature in H. & A. Adams's *Genera of Shells*.

The absence of an odontophore in *Diaphana* H. & A. Adams = *Utriculus* Sars, is certainly a very important character by which the genus can easily be distinguished from *Cylichna* and *Amphisphyra*. But this genus cannot always be distinguished from *Cylichna* by the shell alone. On that account Lovén, Jeffreys, and other able conchologists have referred some of the species of "*Utriculus*" to *Cylichna*.

*Diaphana nitidula* (Lovén) Verrill.

*Cylichna nitidula* Lovén, op. cit., p. 142, 1846.

*Utriculus nitidulus* G. O. Sars, op. cit., p. 286, pl. 17, fig. 13; pl. 26, fig. 3; pl. xi, figs. 6a, 6b (gizzard, &c.).

This shell has been dredged by us in several localities in deep water off the coast of New England and Nova Scotia, and by Mr. Whiteaves in the Gulf of Saint Lawrence. This season it was taken at stations 891, 892, and 894, in 365 to 500 fathoms.

\* This change was probably first made in the edition of 1834, which I am unable to consult.



It is a small, very smooth, white shell, in form closely resembling young specimens of *Cylichna alba*, for which it may easily be mistaken. It lacks the fine spiral lines usually seen on the latter, and is rather more narrowed posteriorly. The apex of the spire is occupied by a shallow depression, and there is no umbilicus.

***Diaphana gemma* Verrill.**

Amer. Journ. Sci., xx, p. 399, Nov., 1880.

Shell oblong, suboval, widest a little in front of the middle, truncate posteriorly and obliquely rounded anteriorly, with a distinct umbilicus, and also with a narrow, deep pit at the apex. Texture of shell rather solid, somewhat thickened. Outer lip rising somewhat above the spire, forming a rounded posterior angle; throughout most of its length only slightly convex, often nearly straight; anteriorly, a little expanded and produced, well rounded, thickened. Inner lip more thickened, with the edge a little revolute, but leaving a small and regular umbilicus. Aperture narrow posteriorly, ovate anteriorly. Surface smooth and glossy, without any sculpture over the middle region, but with several well-defined, not crowded, but fine spiral grooves at each end, visible with a lens. Color grayish white. Length, 4.2<sup>mm</sup>; breadth, 2.5<sup>mm</sup>.

Stations 871 and 873, 100 to 115 fathoms, fine sand, south of Martha's Vineyard and Newport, R. I.

I have had no opportunity to examine the animal of this species, and refer it to *Diaphana*, provisionally, because of its resemblance to *D. umbilicata*. It may prove to be a *Cylichna*. It has some resemblance to *C. occulta* Mighels (= *C. propinqua* Sars). The latter is, however, destitute both of the pit at the summit of the spire and of the umbilicus, and its surface is everywhere covered with distinct spiral lines. Our shell is shorter and stouter than *D. umbilicata*.

***Diaphana conulus* (Desh.).**

*Utriculus conulus* G. O. Sars, op. cit., p. 287, pl. 17, figs. 17 a-c.

A perfect living specimen of this very distinct species was taken at station 870, in 155 fathoms. It has not been recorded hitherto from the American coast.

***Amphisphyræ globosa* Lovén, 1846.**

*Diaphana globosa* G. O. Sars, op. cit., p. 290, pl. 18, figs. 3 c, 4; pl. xi, fig. 12 (dentition).

Specimens agreeing in all respects with Sars's figures, referred to above, were dredged at stations 870, 871, and 894, in 115 to 365 fathoms, south of Martha's Vineyard and Newport.

***Amphisphyræ pellucida* (Brown) Lovén, 1846.**

*Diaphana pellucida* Brown, Ill. Recent Conch., pl. 19, figs. 10, 11, 1827.

*Bulla hyalina* Turton, Mag. Nat. Hist., vii, p. 353, 1834 (*non* Gmelin).

*Bulla debilis* Gould, Invert. Mass., ed. i, p. 164, fig. 95, 1841.

*Utriculus hyalinus* Jeffreys, Brit. Conch., iv, p. 427; v, pl. 94, fig. 7.

*Diaphana hyalina* G. O. Sars, op. cit., p. 289, pl. 18, figs. 1 a, b; pl. xi, fig. 10 (dentition).

*Diaphana debilis* Gould, Invert. Mass., ed. ii, p. 216, fig. 507.

This species occurred at stations 876 and 894, in 120 and 365 fathoms.



The name *pellucida* clearly has priority for this species, and should be adopted; moreover, *hyalina* had been previously used. Jeffreys, although he admits the priority of Brown's name, claims that it is "obsolete" because no one has used it, "except its author". But Lovén, A. Adams and others have correctly adopted it. Moreover, Jeffreys himself does not apply this idea in regard to "obsolete" names in many other cases, as, for example, in the case of *Margarita olivacea* (Brown), an "obsolete" name revived by him to replace *argentata* Gould.

**Cylichna Gouldii** (Couth.) Verrill.

*Bulla Gouldii* Couthouy, Bost. Journ. Nat. Hist., ii, p. 181, pl. 4, fig. 6, 1838.

*Utriculus Gouldii* Stimpson.—Gould, Invert. Mass. (second ed.), p. 217, fig. 508.

Living specimens of this species, of large size and in considerable numbers, were dredged by us in 1879, off Cape Cod, and especially on the sandy portions of Stellwagen's Bank, Massachusetts Bay, in 15 to 25 fathoms.

An examination of the animal shows that it has a gizzard, with calcareous plates, while its dentition agrees with *Cylichna*, to which it should be referred, notwithstanding the character of the spire of the shell. The median teeth are deeply bilobed; the inner lateral ones large and hooked; outer laterals four on each side, slender, spiniform.

This species is very distinct from *Diaphana pertenuis* (= *Bulla pertenuis* Migh.), with which it has sometimes been confounded. The latter occurred at station 894.

**Philine amabilis** Verrill.

Amer. Journ. Sci., xx, p. 398, Nov., 1880.

Animal large, about an inch long, even in alcoholic specimens. In preserved specimens the anterior lobe is large, oblong, truncate behind, obtusely pointed in front, slightly narrowed backward; lateral lobes large; posteriorly the thin membrane covering the shell projects backwards beyond it, and its free edge is divided into several wide, but short, lobes; foot large.

Odontophore with a large inner lateral, hook-shaped tooth on each side, having its inner edge very finely serrulate and each of its lateral edges bordered by a sharp ridge; outside of these there is on each side a single, very much smaller, slender, spiniform, very sharp, slightly bent tooth.

Shell large, but exceedingly thin and delicate, diaphanous, lustrous, and iridescent, with a very wide aperture. The outline is broad-oblong, rounded at both ends; the outer lip, forming the greater part of the shell, is evenly rounded posteriorly, and scarcely projects beyond the level of the spire; in the middle it projects forward in a regular curve, and recedes rapidly in front, where it also becomes slightly broader, and forms a very obtuse, rounded angle; the anterior end is broadly rounded and very much cut away, so that in an end view, from the front, the whole interior of the spire is visible. The inner lip is thin and sharp-

edged, and recedes in a broad curve anteriorly, so that the body of the shell is relatively very small. There is a small, shallow pit in the place of the spire. Sculpture inconspicuous; many lines of growth, and very fine, wavy, spiral striæ, visible with a lens, cover the whole surface, which has a glistening and opalescent or pearly luster.

Length of the entire animal, 25<sup>mm</sup> or more; length of shell, 15<sup>mm</sup>; breadth of shell, 10<sup>mm</sup>.

Several living specimens from station 876, about 100 miles south of Newport, R. I., in 120 fathoms.

This is one of the largest species of the genus, and one of the most beautiful and delicate.

***Philine Finmarchica* M. Sars.**

G. O. Sars, op. cit., p. 296, pl. 18, figs. 10 *a-d*; pl. xii, fig. 1 *a, b* (dentition).

Off Cape Sable, Nova Scotia, 90 fathoms, fine sand, 1877; 70 to 75 miles south of Martha's Vineyard, 65 to 192 fathoms.

***Philine fragilis* G. O. Sars.**

G. O. Sars, op. cit., p. 296, pl. 18, figs. 11 *a-c*; pl. xii, fig. 2 (dentition).

Off Cape Sable, Nova Scotia, 90 fathoms, fine, compact sand, 1877; Jeffrey's Ledge, Gulf of Maine, 88 to 92 fathoms, 1874, several large living specimens.

***Philine cingulata* G. O. Sars.**

G. O. Sars, op. cit., p. 297, pl. 26, figs. 7 *a-c*; pl. xii, fig. 3.

Off Cape Sable, Nova Scotia, 90 fathoms, with the preceding. Taken this season at stations 892 and 894, in 487 and 365 fathoms.

These four species of *Philine* are new to the American coast. Probably additional species of this genus will be detected when all our collections shall have been fully examined.

***Pleurobranchæa tarda* Verrill.**

Amer. Journ. Sci., xx, p. 398, Nov., 1880.

Body subovate, stout, thick, often nearly half as broad as long, usually less, tapering backward and blunt posteriorly; front broad, convex or subtruncate; back more or less convex or swollen in the middle, with the surface wrinkled or irregularly reticulated, with the sunken lines brown, the reticulations smaller posteriorly. Dorsal tentacles short, stout, wide apart, ear-like, subtubular, having a slit on the outer side, with the edges often rolled in. Gill rather large, well exposed in a dorsal view, situated on the right side, behind the middle, and equal in length to nearly one-fourth the body, plumose, bipinnate, with 15 or 16 pinnæ on the upper side. Foot broad, often nearly as wide as the mantle, subtruncate or rounded in front, narrowed and obtuse posteriorly, ordinarily not extending beyond the mantle. The mantle edge is but little prominent, except along the right side. Proboscis protruded in most of the specimens, large, thick, obtusely tapered close to the end, which is emarginate, showing the large odontophore in a

broad, vertical notch. Reproductive organs large and prominent; the two orifices are situated on a large tubercle in front of the gill. The male organ, in extension, is long, slender, usually curled, truncate, about equal in length to half the breadth of the body; it is a tubular organ, with a slit along the lower side, formed by the rolling up of a long, thin, membranous process. At the posterior edge of the tubercle there is a shorter, flat-pointed process, connected with the female organs. Color of dorsal surface yellowish brown, lighter or darker, and reticulated with dark brown, often specked with flake-white; gill and proboscis dark purplish brown; the proboscis with a darker dorsal patch; tentacles sometimes crossed by dark brown bands. Foot salmon-color. Odontophore very large and broad, with 150 to 170 rows of teeth; no median teeth; all the teeth are similar in structure, and show only a gradual change in form and size from the inner to the outer ones. The inner ones are elongated, slightly curved, narrow-lanceolate, with a very acute point and with a smaller, narrow, sharp denticle on the inner edge, parallel to but shorter than the main point; the outer teeth gradually become shorter, blunter, with a smaller denticle, which finally nearly disappears. Length, usually 30<sup>mm</sup> to 40<sup>mm</sup>; breadth, 10<sup>mm</sup> to 14<sup>mm</sup>.

About 20 miles south of Block Island (stations 814 to 817), in 38 fathoms; about 70 to 74 miles south of Martha's Vineyard (stations 865 to 872), in 65 to 192 fathoms, fine, compact sand, very abundant (140 specimens). Also 90 to 100 miles south of Newport, R. I., in 85 to 225 fathoms (stations 873 to 879). Closely resembles *Pleurobranchæa Norwæ-Zelandiæ* in form and color. The latter is a littoral species.

*Derdronotus elegans* Verrill, sp. nov.

Form and general appearance nearly as in *D. arborescens*, but rather more slender. Branchiæ with rather longer stems and less numerous branches than in the latter, but similarly arranged. Tentacle sheaths with the terminal lobes not so finely divided, and with a smaller branch on the outer side, near the base. Frontal processes of the head numerous, large, with elongated stems, and not so much branched as in *D. arborescens*. Color everywhere nearly uniform pale salmon; tentacles more yellowish. The dentition is peculiar and distinguishes it easily from both our other species. Median tooth stout, smooth, entirely destitute of lateral denticles; its free portion, in a dorsal view, is broad-triangular, almost as broad as long, acute at tip; base transversely elliptical, a little broader than the free portion. Lateral teeth about ten on each side, slender, the outer two or three shorter, blunt or subacute; the others are successively longer and larger, and each has a more acute and more oblique tip than those that precede it, except the inner one, which has a shorter tip, with longer spinules. These lateral teeth are rather suddenly curved inward where they begin to taper, and beyond the curve the tip becomes nearly straight again, and very acute, while the anterior edge of the curvature is covered with slender, sharp spinules.

The dentition of this species is very different from that of *D. robustus* and *D. arborescens*. Both of these have the median teeth serrated, and different in form; the latter has broader and less acute lateral teeth.

Off Cape Cod (station 330), 26 fathoms, September 6, 1879.

***Doris complanata* Verrill.**

Amer. Journ. Sci., xx, p. 399, Nov., 1880.

Body depressed, broad-elliptical, well rounded, both in front and behind, the mantle extending much beyond the foot all around, its edge usually undulated. The lower side of the mantle is stiffened with spicules; upper surface slightly convex, nearly smooth, but covered with small, rather distant, and but slightly prominent, conical elevations. Dorsal tentacles large, stout, subelavate (not seen in full extension), with very numerous, crowded, thin, high, lamelliform plications or folds over the entire upper portion; retractile into cavities having plain, sharp edges. Gills large, the two lower, on each side, partially confluent at base, bipinnately and tripinnately divided, retractile into a large common cavity, which has plain edges. Anal papilla a prominent, cylindrical tube in the center of the branchial wreath. Foot relatively small, obtusely rounded posteriorly, emarginate in front, and with a transverse sulcus on the front edge. Head small, rounded in front, with a free, short, thick, ovate tentacle on each side. Odontophore broad, with about seventy to eighty rows of teeth; no median teeth; about twenty-two to twenty-four lateral teeth, on each side, are stout, hook-shaped, with sharp points, and a slight lobe on the outer curvature and another on the inner side; outside of these there are twelve or more shorter, flattened teeth, with obtuse or rounded, incurved, and sharply denticulated or spinulated ends; the outermost teeth are smallest. Length, 50<sup>mm</sup>; breadth, 25<sup>mm</sup>.

Color, above, dull yellowish brown to dusky brown, irregularly finely specked and blotched with dark brown; gills dark brown.

About 70 miles south of Martha's Vineyard, station 872, in 85 fathoms, among sponges (eleven specimens).

This large species is closely related to *D. Johnstoni* and *D. planata* of Europe. It differs from both in its dentition, in having stouter and blunter dorsal tentacles, with more numerous lamellæ, and in having shorter and blunter oral tentacles.

***Polycerella* Verrill, gen. nov.**

Body elongated-ovate, having the same form as *Polycera*. Mantle little developed. Dorsal tentacles (rhinophores) not laminated and not retractile, without sheaths. A row of papillæ along each side of the back, extending beyond the gills. Gills three, pinnate, situated in the middle of the back, nearly as in *Polycera*. Foot auricled. Odontophore with six rows of teeth; median row absent; inner laterals large, curved, with three denticles; two outer rows much smaller, simple, hook-shaped.



*Polycerella Emertoni* Verrill, sp. nov.

Body small, elongated-ovate, rather narrow, somewhat angular, about as high as broad, sometimes higher than broad, tapered and somewhat acute posteriorly, narrowed a little at the neck. Head high, convex above, sometimes bilobed, but often rounded in front, capable of changing its form to a great extent, the part in front of the dorsal tentacles being capable of considerable elongation and of contracting to a truncate form. Foot high and narrow, obtuse posteriorly, the anterior angles prolonged into short but prominent auricles, often curved backward and pointed, at other times short and blunt. Dorsal tentacles rather long, not retractile, but capable of considerable contraction; in extension their length is often equal to the breadth of the neck; they are fusiform or subclavate, blunt, smooth or showing only slight, transverse, irregular wrinkles, changeable in form, sometimes nearly cylindrical, at other times swollen in the middle or toward the tip. Edge of the mantle indicated only by a slight, often crenulated, ridge along each side and around the head. Above this edge there is a row of small papillæ, of which two on each side are in advance of the dorsal tentacles; two are opposite to them, and four or five on each side occupy the space between the tentacles and gills; a row of five or six, on each side, extends beyond the gills to near the end of the body, the posterior ones becoming very small. Behind the gills there are three or four pairs of larger and longer papillæ, situated more dorsally; of these the two pairs next to the gills are longest, and are often nearly equal to the dorsal tentacles in size and length; they are usually somewhat swollen in the middle and blunt at the tip. Two or three pairs of much smaller papillæ are situated on the back, in front of the gills. Gills three, narrow, elongated, pinnate, subplumose, not finely divided, curved backward, not retractile, about equal in length to the dorsal tentacles; the pinnæ are few, alternate, generally incurved, those toward the base more slender.

Color yellowish green to olive-green, varied with lemon-yellow, and blotched and specked with darker green or blackish; foot, tentacles, gills, and dorsal papillæ lighter greenish yellow, sparingly specked with dark green.

Length, 5<sup>mm</sup> to 6<sup>mm</sup>; breadth, 1<sup>mm</sup>; height, 1.12<sup>mm</sup>; length of rhinophores, .88<sup>mm</sup>.

The odontophore is very minute. The teeth of the inner row, on each side, are relatively very large and long, stout, with the shaft bent backward and the end abruptly curved forward and divided into two sharp denticles; another sharp denticle is situated laterally, below the others. The two outer lateral rows of teeth are much smaller and less than half the length of the inner ones, nearly equal in size and form, simple, strongly curved forward, and very acute.

This species was first taken by the writer at Wood's Holl in September, 1875, at the surface, among eel-grass; and on hydroids from the piles of Long Wharf, New Haven, Conn., October, 1875. At Newport, R. I., it has been found several times by Mr. J. H. Emerton and the writer, in



July and August, on filamentous algæ, especially *Ceramium rubrum*, growing on the mooring buoys and piles of wharves in the harbor.

In confinement it often leaves the algæ and creeps at the surface of the water, foot upward.

The eggs of this species were laid in confinement, July 24, at Newport, R. I. They form a long, narrow, oblong or strap-shaped, white mass, attached by one edge to filamentous algæ; the eggs are arranged in numerous rows.

***Coryphella nobilis* Verrill, sp. nov.**

A large and elongated species, with stout dorsal tentacles and large, flattened, pale-salmon dorsal papillæ. Foot broad, elongated, tapering and acute posteriorly; anterior angles considerably elongated, in the form of acute tapering processes, having a distinct longitudinal groove or fold. Head rather small, rounded, in front slightly convex or nearly straight, lower side concave. Oral tentacles very stout, flattened, gibbous near the end, with a small, somewhat upturned, round, acute tip. Dorsal tentacles (rhinophores) very large and stout, arising close together, longer than the oral ones, tapered, subacute, thickly covered with small, conical papillæ or warts. No eyes could be detected. Dorsal papillæ arranged in numerous transverse, oblique rows, each of eight to ten or more papillæ (except posteriorly); they are small and much crowded along the sides; the upper ones are much longer, stout, mostly flattened, widest beyond the middle, tapering to the lanceolate tip.

Color of foot and body translucent white; on the back there are visible, through the integument, salmon-colored vessels, running from one group of dorsal papillæ to another and connecting with their nuclei; the dorsal papillæ are pellucid white externally, with a pale-salmon nucleus, becoming paler and whitish near the tip; dorsal tentacles pale yellowish green; oral ones pellucid white.

Length, about 63<sup>mm</sup>, or 2.5 inches; length of dorsal tentacles, 15<sup>mm</sup> (.6 inch); of longest dorsal papillæ, 12<sup>mm</sup> (.5 inch).

The odontophore has a central row of large teeth, with a moderately prominent, acute, central denticle, and usually six smaller denticles on each side; lateral teeth without distinct denticles on the edge, rather large, wide at the base, which is emarginate, the outer lobe extending further back, inner edge slightly wavy and uneven, but not denticulate.

Off Cape Cod, in 75 fathoms, mud and broken shells, 1879. One specimen only.

In form and color this species resembles *C. salmonacea*, but the latter, which occurs at Eastport, Me., has the dorsal papillæ more crowded, and its dentition is very different, for the lateral teeth are strongly denticulated along the edge to near the tip.

***Coryphella Stimpsoni* Verrill.**

*Cuthona Stimpsoni* Verrill, Amer. Journ. Sci., xvii, p. 314; Trans. Conn. Acad., v, pl. 42, fig. 14.

The dentition of this species is peculiar, but agrees better with that

of *Coryphella* than with that of any of the related genera. It was originally referred to *Cuthona* on account of the lateral expansions of the head. The odontophore is remarkably high and narrow; the central teeth are dark brown, large, strong, with the median point very large, compressed, and curved forward, projecting far beyond the small, sharp, lateral denticles, of which there are usually eight or nine on each side; lateral teeth thin, pale, comparatively small, narrow, acute, without any denticles, or rarely with some very small ones near the base, which is rounded and but little expanded.

This species occurs from Massachusetts Bay to Halifax, Nova Scotia, and from low-water to 50 fathoms.

***Facelina Bostoniensis*** (Couthouy) Verrill & Emerton.

This species has been very much misunderstood, and totally different species\* have often been confounded with it. It is, however, very easily distinguished from all of our other species. It is the only known species from the New England coast that has the dorsal tentacles distinctly laminated or plicated.

It is a true *Facelina*, having only a single row of teeth, with the central denticle prominent.

It is common from above low-water to 20 fathoms, on *Obelia* and other hydroids, from Massachusetts Bay to Block Island and Newport, R. I. This season it occurred abundantly among *Obelia geniculata*, on *Laminaria*, off Block Island, in 18 to 20 fathoms, associated with large numbers of *Lamellidoris muricata*.

This species is very closely related to the European species, *Facelina Drummondii* (Thomp., 1843) and *F. elegans* (Alder & Hancock).

***Facelina pilata*** (Gould) Verrill & Emerton.

In its dentition this species agrees closely with the preceding, having but a single row of teeth, of nearly the same form. It should be referred properly to *Facelina*, although it does not agree strictly with the diagnoses of that genus, especially in respect to the lamination of the dorsal tentacles, which are, in this species, nearly smooth. This character is, however, variable in this genus, the laminae being very prominent in *F. coronata*, rudimentary in *F. elegans*, and absent in *F. pilata*.

***Cratena Veronicæ*** Verrill, sp. nov.

Size moderate, about 25<sup>mm</sup> in length, rather stout. Dorsal papillæ cylindrical, obtuse, moderately slender, arranged in twelve to fifteen regular transverse series on each side, the middle ones containing eight to ten or more papillæ; anterior groups smaller, situated well forward,

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\*The species described by Bergh (Anat. Bid. til Kundskab. om Æolidierne, p. 102, pl. 5 a, 1864) under the name of *Coryphella Bostoniensis* is entirely distinct. It has three rows of teeth, and is closely related to *Coryphella Mananensis* Verrill (Stimpson sp.), common on our northern coasts.

in front of the dorsal tentacles. Oral and dorsal tentacles nearly equal in length, moderately long, tapered, blunt. The dorsal tentacles appear slightly wrinkled transversely. Eyes black, conspicuous, near together, just behind the bases of the dorsal tentacles. Foot narrow, with broad, rounded anterior angles. Head moderately large, its outline nearly semicircular in front, and projecting considerably in advance of the bases of the oral tentacles.

Color variable. In some specimens the nuclei of the dorsal papillæ and the biliary ducts from them are dark green, the nuclei appearing to be lobulated or flocculent; the outer sheath is translucent whitish, with an interrupted streak of flake-white on the distal half, and with unequal specks and spots of the same scattered over the surface, while on the outer side, near the end, there is a patch of orange; tip translucent white. In front of the bases of the dorsal tentacles there is a dark green patch. Tentacles white.

In other specimens, taken at the same time, the nuclei of the dorsal papillæ were salmon-colored, but the subterminal patch of orange and the streak and specks of flake-white were as in the green variety; the body was translucent white; dorsal tentacles white, tinged or faintly reticulated with flake-white; oral tentacles with a streak of flake-white on the posterior side.

Odontophore narrow, with a single row of teeth; these have thirteen sharp denticles, the median one scarcely as long as those next to it; the anterior border of the tooth is nearly semicircular, with a notch on each side near the outer ends, which run backward, as short processes, somewhat enlarged and emarginate at the end.

Off Cape Cod (station 328), in 23 fathoms, among hydroids, September 6, 1879.

This species is nearest allied to *Cratena olivacea* (Alder & Hancock), but differs in the form of its teeth, as well as in its coloration. It is also allied to *Cratena viridis*, of Europe. In case either of the older names (*Carolina* and *Montagua*) be retained for this group, this species should be so named. But both of these names having been previously used for other genera, they should be discarded.

***Cratena gymnota*** (Couthouy) Verrill & Emerton.

*Montagua Gouldii* Verrill, Invert. Viney. Sound, p. 667 (author's copies, p. 373), 1873.

This species, which is common on littoral hydroids, from Massachusetts Bay to New Haven, Conn., is a typical *Cratena* Bergh\* (= *Carolina* Alder & Hancock = *Montagua* auth.), and is very closely allied to *C. aurantiaca* (A. & H.) of Europe, with which its dentition agrees very nearly, even in minute details. In *C. gymnota* the coloration, also, is often similar to that of *C. aurantiaca*, but the dorsal papillæ are fewer

\* In the excellent work of G. O. Sars this generic name has been, by some oversight, misapplied, in place of *Cuthona*, to include *C. nana*, which was the original type of *Cuthona* Alder & Hancock.

and longer, and their clusters are less numerous and less crowded. In case it be thought necessary to unite the two forms, Couthouy's name has priority.

***Tergipes despectus* (Johnst.) Alder & Hancock.**

The genuine *despectus* was distinguished from *G. exigua* by Mr. J. H. Emerton, at Salem, Mass., in 1879, when he made characteristic drawings of both and preparations of the odontophores, which I have examined. During the present year he has found the former near Newport, R. I., on hydroids (*Obelia*) at low-water. The species described and figured by Gould (Binney's edition) under this name is really the *Galvinia exigua* Alder & Hancock, differing widely in its dentition, there being three rows of teeth, instead of the single row, seen in *Tergipes*. But the *T. despectus* of my report on Invertebrates of Vineyard Sound, 1873, was correctly named. Both species are found under the same conditions, but, according to Mr. Emerton, *G. exigua* is found in the spring and early summer, while *T. despectus* occurs later in the summer and in autumn.

***Acmaea rubella* ? (Fabr.).**

*Tectura rubella* G. O. Sars, Moll. Reg. Arct. Norv., p. 121, pl. 8, figs. 5 *a, b*; pl. ii, fig. 11 (dentition).—Jeffreys, Ann. and Mag. Nat. Hist., for March, 1877, p. 231.

One specimen, without the animal, was dredged at station 894. It appears to agree closely with the species referred to, except that the apex is not obtuse, and its color is pale yellowish white. There is no sculpture except irregular and rather distinct lines of growth. The apex is acute, bent directly backward, and situated at about the posterior fourth. The base is oblong-oval. Length, 5.5<sup>mm</sup>; height, 2.75<sup>mm</sup>.

## HETEROPODA.

***Carinaria Atlantica* Ad. & Reeve (?).**

Fragments occurred at station 865. They may have belonged to *C. Mediterranea*.

***Atalanta Peronii* Lesueur.**

D'Orbigny, Voy. Amér. Mérid., Moll., p. 171, pl. 12, figs. 1-15; Hist. l'Isle de Cuba, Moll., i, p. 102, 1853.

Near George's Bank, latitude 41° 25' north, longitude 65° 5' to 65° 30' west (Messrs. S. I. Smith and O. Harger, 1872).

## PTEROPODA.

Although the Pteropods are all, properly speaking, oceanic species, it is undoubtedly true that a certain group of species will be found to be characteristic of the waters adjacent to each coast. Hitherto those observed and recorded from near the shores of New England have been chiefly northern or arctic species, which follow the course of the arctic current along our coast. For this reason, in the winter and spring, the beautiful *Clione papilionacea* is frequently found as far south as Vineyard



Sound and the shores of Rhode Island. The *Spiralis Gouldii* Stimp. is probably also an arctic species, and is very closely related to, if not identical with, *S. balea* of the Arctic Ocean.\* There are, however, a few of the more tropical species that have been already recorded as occasionally cast ashore dead, upon the southern shores of New England. Of these *Diacria trispinosa* and *Cavolina tridentata* are the most common. Of the former, I have also received numerous examples, with the animal in good condition, obtained by Mr. Samuel Powell, at Newport, R. I., several years ago, from the stomach of a blue-fish. This season two living specimens of it were taken off Block Island by Messrs. V. N. Edwards and N. P. Scudder, of our party. The fresh shells of this species were dredged by us in 1871, near Martha's Vineyard, and this year we found it in abundance and perfectly fresh, in all our outer dredgings, 70 to 100 miles off shore. It was associated with *Diacria trispinosa* Gray and several other species, named below, but was far more numerous than any of the others. The following species are here introduced because of their common occurrence, evidently in large numbers, within a few miles of our coast. Several of them have not been recorded from so far north before, even in mid-ocean.

**Cavolina longirostris** (Les. MSS., Bv.) H. & A. Ad.

*Hyalæa longirostris* Blainv., Dict. Sci. Nat., xxii, p. 81.—Rang, Hist. Nat. Pterop., p. 41, pl. 2, figs. 7-10, 1852.

*Cavolina longirostra* Gray, Catal. Moll. Brit. Mus., Pteropoda, p. 8.

This small but elegant species occurred frequently in our dredgings, but not in large numbers (stations 867, 870, 876, 891, 894, &c.).

**Cavolina uncinata** (D'Orb.) Gray, 1850; H. & A. Ad.

*Hyalæa uncinata* D'Orb., 1836.—Rang, Hist. Nat. Pterop., p. 37, pl. 2, figs. 11-14, 1852.

This occurred in many localities, with the last. Our specimens differ from the figures referred to in having the median posterior spine more hooked and more abruptly bent, so as to make nearly a right angle with the shell.

**Cavolina inflexa** (Les.) Gray.

*Hyalæa inflexa* Lesueur; Blainv., Dict. Sci. Nat., xxii, p. 80.

One perfect and full-grown specimen from station 894.

**Clio pyramidata** Browne; Linné; Gmelin.

*Cleodora pyramidata* Peron & Les.; Lamarek.

*Cleodora lanceolata* Rang, Ann. des Sci. Nat., xvi, p. 497, pl. 19, fig. 1.

*Clio pyramidata* Gray, Catal. Moll. Brit. Mus., Pteropoda, p. 12, 1850.

Several fresh but somewhat broken specimens of this species occurred at stations 865, 891 to 894.

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\* It is very distinct from *S. retroversus*, to which Jeffreys has formerly referred it. Both the figure and description give it spiral lines, while the latter is very smooth. G. O. Sars identifies it with *S. balea*.



**Balantium recurvum** Children.

Journ. Roy. Inst., xv, p. 220, pl. 7, fig. 107, 1829.—Gray, Catal. Moll. Brit. Mus., Pteropoda, p. 14, 1850.

*Cleodora balantium* Rang, Mag. Zool., 1834; Hist. Nat. Pterop., p. 52, pl. 5, fig. 12; pl. x, fig. 7, 1852.

Fragments occurred at stations 865 and 869.

**Styliola recta** (Lesneur, MSS.) Blainv., Man. Mal., 1825.

*Creseis acicula* Rang, Ann. des Sci. Nat., I, xiii, p. 318, pl. 17, fig. 6, 1828.

*Creseis clara* Rang, Ann. des Sci. Nat., I, xiii, p. 317, pl. 17, fig. 5, 1828.

*Creseis acus* Esch., Zool. Atlas, iii, pl. 15, fig. 2, 1831.

*Cleodora acicula* Rang, Hist. Nat. Pterop., p. 56, pl. 7, figs. 5, 7, 1852.

Near George's Bank, latitude  $41^{\circ} 25'$ , longitude  $65^{\circ} 5'$  to  $65^{\circ} 30'$ , September, 1872, at surface (Messrs. S. I. Smith and O. Harger).

**Styliola virgula** (Rang) Gray.

*Creseis virgula* Rang, Ann. des Sci. Nat., I, xiii, p. 316, pl. 17, fig. 2, 1828.

*Cleodora virgula* Rang, Hist. Nat. Pterop., p. 57, pl. 13, figs. 20-24, 1852.

Near George's Bank, with the preceding.

**Spiralis MacAndrei** Forbes & Hanley, ii, p. 384.

*Spiralis retrorsus* (Flem.), variety ? *MacAndrei*, Jeffreys, Brit. Conch., 7, p. 115, pl. 4, fig. 4; pl. 98, fig. 5.—G. O. Sars, Moll. Reg. Arct. Norv., p. 330, pl. 29, figs. 3 a-f; pl. xvi, fig. 19 (dentition).

Several entire and perfectly fresh specimens occurred at station 894. They agree with the form called var. *MacAndrei* by Jeffreys.

**Cymbulia calceolus** Verrill.

Amer. Journ. Sci., xx, p. 394, Nov., 1880.

Test thick, transparent, broad-ovate or elliptical, rounded at both ends, covered, above and below, with low, rounded verrucae; aperture large, occupying more than half the length of the test, broad-ovate, posterior margin nearly straight; edges simple, unarmed. Animal pale pink, with a brown nucleus; fins very large, connate, broadly rounded; their outline taken together forms a long ellipse, considerably longer and somewhat broader than the test. Length of test of a medium-sized specimen, in alcohol,  $19^{\text{mm}}$ ; breadth,  $11^{\text{mm}}$ ; expanse of fins,  $23^{\text{mm}}$ ; their breadth,  $12^{\text{mm}}$ . The largest specimens have the test about  $40^{\text{mm}}$  long,  $20^{\text{mm}}$  broad. Stations 865 to 872 (near the surface), common; about 30 miles east-southeast of Block Island, at surface, October 2, 1880 (Messrs. Scudder and Edwards).

**Halopsyche** Verrill, nom. nov.

*Psyche* Rang, 1825 (non *Psyche* Linné, 1735, nec *Psyche* Schrank, 1801).

The name *Psyche* having been twice used before it was employed by Rang, it will be necessary to substitute another name for this genus of Pteropods. I therefore propose *Halopsyche*.

The type, and only known species, *Halopsyche globulosa* (Rang), inhabits the waters of Newfoundland and Nova Scotia.

## SOLENOCONCHA.

**Dentalium occidentale** Stimp.

Shells of New England, 1851 (based on *D. dentale* Gould, 1st ed., p. 155, fig. 5, *not* of European authors).

*Dentalium dentale* Gould, Invert. of Mass., 2d ed., p. 236.

*Dentalium abyssorum* M. Sars, 1858.

*Dentalium striolatum* Jeffreys (*non* Stimpson).

*Antalis striolata* G. O. Sars, Moll. Reg. Arct. Norv., p. 101, pl. 7, fig. 1; pl. 20, figs. 10 *a, b*; pl. i, figs. 1 *a-c*, dentition (*non* Stimpson sp.).

This species is abundant on muddy bottoms, in 50 to 300 fathoms, all along the coast of New England and Nova Scotia.

Mr. Jeffreys, misled by a singular and unaccountable mistake, has constantly applied to this sulcated species the name given by Stimpson to our common, shallow-water, *nearly smooth form*. In this mistake G. O. Sars and others have followed him.

The question as to the *specific* distinctness of these two forms I do not propose to discuss at this time, but it is equally desirable that the respective *names* should be correctly applied, whether we regard the forms as varieties or species. Of *D. striolatum*, I have dredged thousands of specimens in shallow water in the Bay of Fundy, in the same region where Stimpson's original specimens were taken, and among them no specimens of "*D. occidentale*" are to be found. In other localities, however, both species occur together. Both were taken this season on the outer banks, off Newport. But *D. occidentale* was by far the most common, and was abundant in the deeper stations, where *D. striolatum* did not occur at all.

Among the specimens taken by us there are many that are more strongly ribbed and sulcated than usual, the ribs being more or less angular and elevated. In some of these, which are slender and about an inch long, the internal surface of the shell has grooves corresponding to the external ribs, the shell being thin, but of uniform thickness, so that the two surfaces are parallel. In others of the same size the bore of the shell is smooth and round, the shell being thickened opposite the ribs. I am not prepared, however, to say that this is anything more than a varietal difference.

The form of the posterior notch varies in all our species (or varieties) from a shallow notch to a triangular cut, and even to a deep slit.

**Siphonodentalium vitreum** Sars.

G. O. Sars, op. cit., p. 103, pl. 7, figs. 2 *a-c*; pl. i, figs. 2 *a-f* (dentition).—Verrill, Trans. Conn. Acad., v, pl. 42, fig. 19.

A fine, large specimen, probably belonging to this species, was dredged by the party on the "Bache", in 1873, in the Gulf of Maine (station 12 B), in 60 fathoms, mud.

The shell is smooth, round, very thin, transparent, and lustrous. It is slightly curved and expands gradually to the anterior end. The posterior opening is small and round, without lobes, but it probably has

been broken off squarely. Length,  $12^{\text{mm}}$ ; diameter of larger end,  $2.5^{\text{mm}}$ ; of small end,  $.5^{\text{mm}}$ .

Another specimen of similar character,  $10^{\text{mm}}$  long and  $2.5^{\text{mm}}$  broad, was dredged in the Gulf of Maine, 107 fathoms (station 9 B), 1873. With the last-named specimen there was, however, a perfect living specimen,  $7^{\text{mm}}$  long and  $2^{\text{mm}}$  broad, having the posterior end perfect and provided with the characteristic digitations around the opening.

**Siphonentalis affinis** (Sars).

G. O. Sars, op. cit., p. 104, pl. 20, fig. 12.—Verrill, Trans. Conn. Acad., v, pl. 42, figs. 20 a-b.

A specimen smaller and more slender than the preceding species, and which I refer to *S. affinis*, was dredged by us, in 1877, in Bedford Basin, near Halifax, Nova Scotia, 35 fathoms, soft mud. It is  $6^{\text{mm}}$  in length,  $1^{\text{mm}}$  in breadth, slightly curved, round, smooth, glossy, and translucent. The posterior opening is small and appears to be perfect; it shows only a faint indication of a notch on the convex side.

**Siphonentalis Lofotensis** (M. Sars).

G. O. Sars, Moll. Reg. Arct. Norv., p. 104, pl. 20, figs. 11 a, b; pl. i, fig. 3.

A few specimens that agree well with the figures and description of this species were taken at station 891, in 500 fathoms.

It is longer and more tapered than the last, and much less translucent.

**Cadulus propinquus** G. O. Sars.

Moll. Reg. Arct. Norv., p. 106, pl. 20, figs. 15 a, b; pl. i, fig. 5 (dentition).

This shell occurred in considerable numbers, living, at station 871, in 115 fathoms. It is a small, polished species, rather stouter and more swollen than the next.

**Cadulus Jeffreysii** Monterosato.

*Cadulus subfusiformis*? Jeffreys, British Couch., v, p. 196, pl. 101, fig. 3 (*non* Sars, teste Monter.).

Several specimens of a small *Cadulus*, somewhat swollen in the middle and rather strongly bent, I refer to the above species. The posterior aperture is simple in most of them, but slightly notched in others.

Station 871.

**Cadulus Pandionis** Verrill & Smith.

Amer. Journ. Sci., xx, p. 397, Nov., 1880.

A very much larger, highly polished species occurred at many of the stations, but most abundantly at 869 to 871 and 873 to 877 in 85 to 192 fathoms. It is swollen on the convex side, in the middle, and slightly angulated or gibbous at about the anterior third. It is transversely elliptical in section; the anterior end decreases to the aperture, which is oblique, the lip being prolonged on the concave side. Posterior aperture small, with a semicircular notch above and below. Length,  $10^{\text{mm}}$ ; breadth,  $2.25^{\text{mm}}$ ; of mouth,  $1.75^{\text{mm}}$ ; of posterior aperture,  $.40^{\text{mm}}$ .

## LAMELLIBRANCHIATA.

**Poromya granulata** (Nyst) Forbes & Hanley.

G. O. Sars, op. cit., p. 90, figs. 6 *a, b*.—Verrill, Trans. Conn. Acad., v, pl. 44, figs. 3, 4.

Several adult living examples of this shell were dredged in 1872 by Dr. A. S. Packard and Mr. C. Cooke, on the Coast Survey steamer "Bache", in the Gulf of Maine, in 150 fathoms, mud. This season it was taken at station 865, in 65 fathoms. It has not previously been recorded as American.

In form and size it somewhat resembles *Thracia myopsis*, but is easily distinguished by the small granules scattered over the exterior, and by the peculiar hinge, very different from that of *Thracia*. The right valve has a prominent, recurved, cardinal tooth. On the European coast it ranges from the Lofoden Islands to the Mediterranean, in deep water.

**Poromya rotundata** Jeffreys.

Annals and Mag. Nat. Hist., Dec., 1876, p. 494 (Valorous Expedition, Mollusca).

Shell rounded, thin, translucent, pearly within. External surface closely covered with small, rounded, obtuse granules, arranged mostly in close quincunx, and distinctly forming radiating lines, but in some parts appearing to be also in concentric lines. The narrow intervals between these lines of granules show the iridescent surface of the shell. These granules give a shagreen-like appearance to the shell. The granules show through on the inside, giving a finely tessellated appearance. The shell is but little longer than broad, convex; ventral and anterior edges evenly rounded; posterior dorsal edge a little sloping, and forming an obtusely rounded angle where it meets the curvature of the posterior end. Hinge of right valve with a prominent conical tooth, fitting into a corresponding pit in the left valve.

South of Martha's Vineyard, stations 865 and 871, 65 to 115 fathoms, living; North Atlantic, 1,450 fathoms (Jeffreys).

**Lyonsiella abyssicola** M. Sars; Friele.

*Pecchiolia abyssicola* G. O. Sars, Remarkable Forms Anim. Life, i, p. 25, pl. 3, figs. 21-43; Moll. Reg. Aret. Norv., p. 103, pl. 20, figs. 5 *a-d*.

A few good living specimens of this interesting addition to the American fauna were dredged by our party this season, south of Martha's Vineyard and Newport, in 192 to 500 fathoms, fine, compact sand and mud (stations 869, 880, 891, 892, 894).

**Lyonsiella gemma** Verrill, sp. nov.

Shell small, iridescent, white, with raised radii, broad-oval, widest and broadly rounded anteriorly, expanded and broadly rounded ventrally, posterior end short, narrowed, and tapered to an obtuse point. The beak is subcentral, but a little nearer the anterior end, prominent, inflated, strongly curved inward and forward. Dorsal margin abruptly incurved opposite the beaks and decidedly expanded and excurved in

front of them, so as to rise nearly to a level with the umbos; internally, opposite the tips of the beaks, there is a smooth swelling within the margin. Hinge margin thin, toothless, but with an internal scar behind the beaks, where the ligament and ossicle were attached (the ligament is gone). Palial sinus very small, angular. Shell less thin than in the preceding species. Sculpture numerous, very delicate, slightly raised lines, which radiate from the beaks over the whole surface; they are separated by much wider interspaces, which are smooth and iridescent, and not at all excavated. Length, 4.5<sup>mm</sup>; height (beak to ventral margin), 4<sup>mm</sup>.

One perfect specimen, station 892, 487 fathoms, associated with *L. abyssicola*.

From the latter it differs widely in shape, having nothing of the rectangular form so characteristic of that species; the latter is also much less expanded anteriorly and much more so posteriorly, being far more inequilateral and more elongated.

**Kennerlia glacialis** (Leach) Carpenter.

*Pandora glacialis* Leach, Rosse's Voyage, appendix, p. 174.—Leche, Kongl. Vetensk.-Akad. Handl., Band 16, p. 11, pl. 1, figs. 1 a, b, 1-78 (author's copy).

Living specimens of this arctic shell were dredged at station 873, in 100 fathoms. It had previously been recorded from the Gulf of Saint Lawrence by Whiteaves, but was not known to occur on the New England coast. It differs widely from the common *Clidiophora trilineata* Cpr. (= *Pandora trilineata* Say), in the absence of the internal radiating ridges, in its more inequilateral and irregular form, and in the greater convexity of the upper valve. The lower valve is very flat, or even concave, and is marked externally with several distinct radiating lines.

**Neæra glacialis.**

G. O. Sars, op. cit., p. 88, pl. 6, figs. 8 a-c.—Verrill, Trans. Conn. Acad., v., pl. 44, fig. 10 b.

A form of *Neæra*, agreeing perfectly with this, is common on muddy bottoms, in 50 to 192 fathoms, off the coasts of New England and Nova Scotia. We have dredged it off Cape Cod, off Cape Ann, off Casco Bay, in the Bay of Fundy, and in numerous localities in the Gulf of Maine and off Nova Scotia, since 1872; and recently, south of Newport and Martha's Vineyard, in 65 to 500 fathoms. The larger specimens exceed an inch in length.

Among our numerous examples there is, however, considerable variation, both in the form of the shell and in the size and shape of the cartilage-pit and lateral teeth. Moreover, the variations in the hinge are not correlated with the differences in the breadth and length of the rostrum. Therefore, it seems to me probable that this shell should be considered merely a variation of *N. arctica*. The latter, in its typical form, occurs in the same localities and in about the same numbers, and



some examples grow to even greater size, being 1.25 inches long. In our specimens (see Trans. Conn. Acad., v, pl. 44, fig. 10 *a*) the rostrum is usually longer and narrower than in the specimen figured by Sars, approaching in this respect his figure of *N. glacialis*, but with the cartilage-pit as large and broad as in his *N. arctica*. In fact, the majority of our specimens may be described as intermediate between the two forms figured by Sars.

*Neæra obesa* Lovén (1846) == *N. pellucida* Stimpson (1852).

Associated with the preceding, in most of the localities named, I have found another form, often .5 of an inch or more in length, which I consider identical with *Neæra obesa* of Lovén, and which often agrees well with the figures of this species given by G. O. Sars, but with the rostrum more commonly somewhat shorter. The cartilage-pit has the same form as the one figured by Sars. The young of this shell is the *Neæra pellucida* of Stimpson, without doubt. I have repeatedly dredged it in his original locality.

*Neæra obesa*, as thus determined, is closely allied, in form and structure, to *N. arctica* and var. *glacialis*. Its texture is thinner, more delicate, more translucent, and smoother, or with less conspicuous lines of growth, and freer from adherent mud. These differences are not merely due to age, for I have examined both forms, of various sizes, from .10 of an inch or less, in length, up to the full-grown specimens.

The largest specimens of *N. obesa* are, however, rarely more than .50 of an inch in length. The shell is usually very swollen and ventricose, rather abruptly contracted posteriorly at the base of the rostrum, which is rather narrow and not very long, but varies considerably in length and breadth. The cartilage plate is prominent, and projects inward so as to form a distinct angle.

*Neæra jugosa* S. Wood.

G. O. Sars, op. cit., p. 83, pl. 6, figs. 9 *a-c*.

This species is easily distinguished from all others found on our coast by its concentric raised lamellæ. Station 894, 365 fathoms, off Newport, R. I.

*Neæra rostrata* (Spengler) Lovén.

G. O. Sars, op. cit., p. 89, pl. 6, figs. 7 *a, b*.

Several fine, large specimens of this species were dredged by us about 70 to 75 miles south of Martha's Vineyard, in 85 to 115 fathoms, and 90 to 100 miles south from Newport, R. I., in 120 to 500 fathoms. It is easily distinguished from the forms above mentioned by its very long and narrow posterior beak or rostrum, and by the oval form of the shell. It has a nearly smooth surface.

*Neæra multicostata* Verrill & Smith, sp. nov.

This is a large and very distinct species, easily distinguished from all others known on our coast by the strong radiating ribs which cover the

whole surface of the shell. The shell itself is rather large, swollen, subovate, well-rounded ventrally, but obliquely subtruncate anteriorly. Rostrum rather short, narrow, well defined, tapered; on the rostrum there are eight or nine rather broad, low, radiating costæ. The body of the shell is covered with regular, raised and strong, radiating costæ, over fifty in number, separated by deep grooves of about the same width as the costæ; anteriorly these ribs become small; posteriorly, near the base of the rostrum, five or six become much larger than the rest, and have smaller ones alternating with them.

Color yellowish white; in life rosy, from the internal organs showing through. Length, 19<sup>mm</sup>; beak to ventral edge, 12<sup>mm</sup>.

South of Martha's Vineyard, 115 fathoms; about 90 to 100 miles south of Newport, 85 to 120 fathoms, stations 871, 873, 874, 876, &c. Several living specimens of various sizes.

*Cardium*, sp.

A roundish species of *Cardium*, about 18<sup>mm</sup> in diameter, is represented by a single valve, in good condition. The surface is rather closely and regularly cancellated. The ribs are smooth, without scales or spines. It was taken at station 865.

*Astarte crenata* Gray.

Parry's Voyage, app.—Friele, Catal. Norv. Nordmeer-Exp. Spitzbz., Möll., p. 267, 1879.

? *Astarte crebricostata* Forbes; Jeffreys; G. O. Sars; and other European writers.

*Astarte crebricostata* Gould, Invert., Mass., 2d ed., p. 126, fig. 440 (var. *lens*).

*Astarte lens* (Stimp., MSS.) Verrill, Amer. Journ. Sci., iii, p. 237, 1872.

Large numbers of specimens, which seem to agree closely with the typical arctic and deep-water form of this species, were taken at nearly all the stations, in 65 to 500 fathoms. It was most abundant at stations 880, 894, 895.

These form series that appear to graduate into the large, broad, flattened form to which the name *lens* has been applied, which is abundant in the Bay of Fundy and Gulf of Maine, in 50 to 150 fathoms.

The typical form is smaller, more swollen, with the edges more rounded, and less expanded posteriorly. All the forms have the edges regularly crenulated.

*Cryptodon Sarsii* (Phil.).

*Axinus Sarsii* G. O. Sars, op. cit., p. 60, pl. 19, figs. 5 a, b.

A single dead specimen of a shell agreeing very closely with this form, as figured by G. O. Sars, was dredged by our party, in 1879, off Cape Cod.

*Crypton obesus* Verrill.

Amer. Journ. Sci., iii, p. 237, pl. 7, fig. 2, 1872.

I may take this occasion to remark that Sars's figure (pl. 19, fig. 7) of *C. obesus* Verrill does not represent the large form described by me under that name, which is remarkable not only for its swollen form, but

also for its great height (from beak to ventral edge), as compared with its length, while the shell figured by Sars is broadly rounded, more like our typical *C. Gouldii*, of which I am inclined to consider it the adult state.

Very large and characteristic specimens of the typical *C. obesus*, several of them more than 15<sup>mm</sup> broad, but mostly dead, have been frequently dredged this season, off Newport, R. I., in 12 to 20 fathoms, and especially at stations 865-871, 873, 876, and 877, in 65 to 192 fathoms, south of Martha's Vineyard and Newport.

**Cryptodon ferruginosus?** (Forbes).

*Axinus ferruginosus* G. O. Sars, Moll. Reg. Arct. Norv., p. 63, pl. 19, figs. 10 a, b.

Living specimens were taken at station 871, in 115 fathoms. They were thickly incrustated with iron-oxide, which adheres very tenaciously; beneath this crust the shell is usually much eroded.

**Loripes lens** Verrill & Smith.

Amer. Journ. Sci., xx, p. 400, Nov., 1880 (published Oct.).

Shell rather thin, moderately convex, well rounded, nearly equilateral; beaks acute, a little prominent, curved forward; lunule small, deeply excavated, cordate; ligamental area long, narrow-lanceolate, a little sunken, so that the ligament scarcely rises to a level with its edges. The posterior dorsal outline of the shell is nearly straight or but slightly convex; the posterior end is very obtusely rounded or subtruncate, making a slight angle with the dorsal edge and a very obtusely rounded one with the ventral edge, which is evenly curved and continuous with the regularly rounded anterior end; dorsal edge in front of the beaks incurved. Surface rather smooth, especially toward the umbos, but with more or less numerous and irregular lines of growth, marked by thin and slightly raised lines, which become more regular and more conspicuous at each end of the shell, and especially posteriorly. A faint ridge runs from the beak to the posterior ventral angle. A slight undulation or depression (often obsolete) runs from the beak to the upper part of the anterior edge, bounding a small anterior dorsal area. Hinge without any distinct teeth. Anterior muscular scar elongated, somewhat sinuous; posterior one small, ovate. Shell usually yellowish white; young specimens, when living, are translucent, flesh-color, owing to the animal showing through. Length of the larger specimens, 14<sup>mm</sup>; breadth or height, 12.5<sup>mm</sup>.

Dredged in 1879 in many localities off Cape Cod, in 50 to 100 fathoms; in 1880 common at nearly all the outer stations, in 65 to 192 fathoms (stations 865 to 877). Most of the specimens are dead, but fresh.

**Tellinmya ferruginosa** (Mont.).

G. O. Sars, Moll. Reg. Arct. Norv., p. 70, pl. 20, figs. 1 a-c.

*Montacuta ferruginosa* Jeffreys, Brit. Conch., ii, p. 210; v, pl. 31, fig. 9.

Several living specimens from stations 892, 893, and 894, in 365 to 487 fathoms. They were all thickly coated with a brown ferruginous crust, beneath which the shell is usually eroded.

**Leda unca** Gould.

Proc. Bost. Soc. Nat. Hist., viii, p. 282, 1832.—Otia Conch., p. 239 (= ? *Leda acuta* Conrad, described as fossil).

Many of our specimens are much larger than the shells described by Gould and Conrad. Our larger specimens are 13<sup>mm</sup> long, 8<sup>mm</sup> broad.

This shell is rather strong and thick, oval, swollen, rounded anteriorly, but posteriorly narrowed to an acute, short, angular beak, at the base of which there is a slight incurvature of the ventral edge. The nearly straight posterior dorsal edge slopes regularly to the beak, and is somewhat compressed or keeled. The whole surface is covered with numerous prominent, regular, rounded, concentric ribs, separated by deep grooves of about the same width. On the posterior dorsal area these ribs are smaller, and are often nearly obsolete close to the edge.

Taken in considerable numbers, alive and dead, at many of the stations, both south of Martha's Vineyard and south of Newport, R. I., in 85 to 155 fathoms, especially at stations 871, 873, 874, and 876.

This species appears to be allied to *L. Messanensis* Cant. (= *L. acuminata* Jeff.), from deep water in the Mediterranean.

**Leda pernula** (Müller).

G. O. Sars, op. cit., p. 35, pl. 5, fig. 1 *a-d*.

A specimen that appears to be a typical example of this species was dredged by us in 1877, off Halifax, in 59 fathoms. It has a smooth, lustrous, yellowish-green epidermis. The concentric grooves are irregular and mostly obsolete, except anteriorly, where they are fine and close. The form is similar to that of *L. tenuisuleata*. Length, 23<sup>mm</sup>; height, 10<sup>mm</sup>.

**Yoldia frigidia** Torell.

Spitz. Moll., p. 148, pl. 1, fig. 3, 1859.—G. O. Sars, Moll. Reg. Arct. Norv., p. 39, pl. 4, figs. 11 *a, b*.

This species occurred at station 894. It had not previously been obtained off the New England coast, but had been dredged in the Gulf of Saint Lawrence, by Whiteaves, in 200 fathoms.

**Arca glacialis** Gray.

G. O. Sars, op. cit., p. 43, pl. 4, figs. 1 *a-c*.—Verrill, Trans. Conn. Acad., v, pl. 44, fig. 5.

This species has been dredged in numerous localities by the various dredging parties of the United States Fish Commission, since 1872, in the Bay of Fundy, Gulf of Maine, off Cape Cod, on George's and Le Have Banks, and off Halifax, Nova Scotia, at various depths from 90 to 430 fathoms; about 70 to 75 miles south of Martha's Vineyard, in 115 to 192 fathoms, and south of Newport, in 85 to 500 fathoms. It attaches itself to pebbles or gravel-stones by a small but strong ventral byssus.

The shorter and more rounded form, known as *Arca pectunculoides* Scacchi, also occurs on our coast, as well as the deformed variety called var. *septentrionalis* by G. O. Sars. These appear to me to be mere vari-



ations of *A. glacialis*. The shortest and most rounded forms that we have taken were dredged south of Martha's Vineyard and south of Newport, in 85 to 225 fathoms, this season.

***Limopsis cristata* (?) Jeffreys.**

Ann. and Mag. Nat. Hist., 1876, p. 434; Proc. Zool. Soc. London, 1879, p. 585, pl. 46, fig. 8.

A few dead specimens, referred doubtfully to this species, occurred at stations 865 to 867 and at 870 and 871, in 65 to 155 fathoms.

***Limopsis minuta* (Philippi).**

G. O. Sars, Moll. Reg. Arct. Norv., p. 44, pl. 3, figs. 5 a-c.

*Limopsis borealis* Jeffreys, Brit. Conch., ii, p. 164; v, p. 174, pl. 100, fig. 3.

This shell was taken in abundance, living, at stations 893, 894 and 895, in 238 to 372 fathoms; in smaller numbers at 891 and 892, in 487 to 500 fathoms; and sparingly at several other localities in 115 to 252 fathoms.

***Modiola polita* Verrill & Smith.**

Amer. Journ. Sci., xx, p. 400, for Nov., 1880 (published Oct. 25).

Two living specimens were taken at station 895, in 238 fathoms.

***Avicula hirundo* (?) L., var. *nitida*, nob.**

The shell is very inequivalve, the right shell being smaller and flatter, and much bent inward near its ventral edge. The form is very oblique, with the anterior ear small and short, in the left valve, and separated from the body of the shell by a slight incurvature of the edge, from which a depression runs to the beak; right valve with a shallow byssal notch. Posterior ala short, triangular, with a rounded incurvature of the posterior edge of the shell, separating it from the body of the shell, which is produced and rounded at the end. Surface nearly smooth, glossy, and somewhat iridescent, with regular but inconspicuous lines of growth, which on the anterior ears rise up into thin, wavy lamellæ.

Color translucent, pale yellowish, usually with a brown streak radiating from the beak to the outer edge.

Length, beak to outer edge, 13<sup>mm</sup>; length of hinge-line, 11<sup>mm</sup>; beak to end of posterior ala, 8<sup>mm</sup>.

This shell was found in considerable numbers adhering to hydroids, in 65 to 192 fathoms, south of Martha's Vineyard (stations 865 to 867, and 869 to 873). In form it resembles the young *Avicula hirundo* of Florida and the West Indies. It is, however, much smoother and more lustrous than any specimens of that species which I have hitherto seen, and may well prove to be a distinct species, for which I would, in that case, propose the name *nitida*.

***Limæa subovata* (Jeffreys).**

*Lima suborata* Jeffreys, Annals and Mag. Nat. Hist., Nov., 1876, p. 427.

Shell small, white, ovate, nearly equilateral, with the valves convex, much swollen in the middle; beaks prominent, incurved; hinge-line straight, shorter than the shell; ligament-pit narrow, elongated, lunate.



Sculpture very numerous (70 to 80 or more) radiating ribs, fine laterally, increasing in strength on each side to the middle, where there are two or three ribs considerably larger than the rest, with wider intervals; the ribs and intervals are crossed by fine, close, raised lines of growth.

Interior with radiating lines corresponding to the external ones. Length, 4<sup>mm</sup>; height (beak to ventral edge), 7<sup>mm</sup>; thickness, 4<sup>mm</sup>. Station 880, 255 fathoms, scarce; 891 to 894, 365 to 500 fathoms, common.

*Lima gibba* (= *Lima gibba* Jeffreys, op. cit., p. 428) also differs but little from our specimens.

**Pecten fenestratus** Forbes (?).

Report on Mollusca, &c., of Ægean Sea, p. 146, in Proc. British Assoc. for 1843.

*Pecten inequisculptus* Tiberi (teste Jeffreys).

A small, but elegantly colored and sculptured, inequivalve *Pecten* was taken living at station 872. This I refer doubtfully to the above-named, Mediterranean deep-water species. In our two examples the upper valve is finely and regularly cancellated, with fine radiating and concentric lines; the under valve is covered with fine, raised, concentric ribs only. Ears prominent. Color whitish and different shades of red and brown, irregularly mottled.

**Pecten**, sp. (near *P. opercularis*).

Fragments of a large and peculiar *Pecten* occurred at stations 873 and 874. They closely resemble, in sculpture, the *P. opercularis* of Europe, except that the large ribs are triangular and carinated at summit, instead of rounded. These large ribs are separated by equally wide, concave interspaces, which, like the ribs, are marked by slightly concave, radiating furrows, and the surface of these furrows is covered with thin, concentric, slightly raised, wavy plates, the waves being limited by the fine radiating ridges between the grooves. Interior of valves with broad, flat grooves, alternating with flat ribs of the same width. Color grayish white, the ribs pale reddish.

*List of species enumerated in the preceding article.*

[One asterisk signifies that the species is an addition to the New England or North American fauna; two, that it is a newly discovered species; E=European; G=Greenlandic; M=middle region of New England, or both north and south of Cape Cod; N=northern coasts of America (Cape Cod to Labrador); S=southern; O=oceanic; P=North Pacific.]

* *	<i>Heterotenthis tenera</i> V.	* G. E.	<i>Bela rugulata</i> (Möller).
* G. E.	<i>Gouatus amœnus</i> (Möll.) Gray.	* P. E.	<i>Bela simplex</i> (Middend.).
* *	<i>Callitenthis reversa</i> V.	* *	<i>Bela hebes</i> Verrill.
* *	<i>Alloposus mollis</i> V.	* *	<i>Pleurotoma Agassizii</i> V. & S.
* O. E.	<i>Argonauta Argo</i> Linné.	* *	<i>Pleurotoma Pandionis</i> V. & S.
* G. E.	<i>Bela Pingelii</i> (Möller).	* *	<i>Pleurotoma Carpenteri</i> V. & S.
* N. E.	<i>Bela Sarsii</i> Verrill.	* *	<i>Taranis pulchella</i> V.
* E. N.	<i>Bela tenuicostata</i> Sars.	* E.	<i>Taranis Mörchii</i> (Malm) Jeff.
N. E.	<i>Bela Trevelyana</i> (Turton).	* S.	<i>Marginella roscida</i> ? Rav.
N.	<i>Bela cancellata</i> (Migh.) St.	* G. E.	<i>Tritonofusus latericeus</i> (Möll.)
* N. E.	<i>Bela impressa</i> Möreh.		Moreh.
* N. G. E.	<i>Bela exarata</i> (Möller).	* *	<i>Neptuncea (Sipho) cœlata</i> Verrill.

- \* \* *Neptunca (Sipho) arata* Verrill.  
 \* E. N. *Neptunca propinqua* (Alder).  
 \* N. G. E. *Buccinum cyaneum* Brug.  
 \* \* *Nassa nigrolabra* V.  
 N. G. E. *Lunatia nana* (Möller).  
 \* \* N. *Lunatia levicula* V.  
 \* \* *Lamellaria pellucida* V.  
 \* G. E. *Marsenina prodita* Bergh.  
 N. G. E. *Marsenina glabra* (Couth.) V.  
 \* \* N. *Marsenina ampla* Verrill.  
 \* P. E. N. *Felutella erytospira* (Middend.).  
 \* G. E. N. *Trichotropis conica* Möller.  
 \* \* M. *Cingula harpa* Verrill.  
 \* E. *Cingula turgida* (Jeff.) V.  
 \* N. G. E. *Cingula Jan-Mayeni* (Friele) V.  
 \* \* *Lepetella tubicola* V. & S.  
 \* \* N. S. *Lovenella Whitcavesii* Verrill.  
 \* E. *Truncatella truncatulus* (Drap.).  
 \* \* *Solarium boreale* V. & S.  
 \* \* *Scalaria Pourtalesii* V. & S.  
 \* \* *Scalaria Dalliana* V. & S.  
 \* \* *Scalaria*, sp.  
 \* \* *Aeisa gracilis* Verrill.  
 \* N. E. *Aelis Walleri* Jeff.  
 \* \* N. S. *Aelis striata* Verrill.  
 \* \* *Calliostoma Bairdii* V. & S.  
 \* \* *Margarita regalis* V. & S.  
 \* \* *Margarita lamellosa* V. & S.  
 \* \* N. *Margarita*, sp.  
 \* E. N. *Machaeoplax bella* (Verk.) Friele.  
 \* E. *Cyclostrema trochoides* (J.) Sars.  
 \* E. *Assiminea Grayana* Leach.  
 E. *Eulima intermedia* Cant.  
 \* E. *Eulima distorta* Desh.  
 N. S. *Turbonilla nirea* (Stimp.).  
 \* \* *Turbonilla Rathbuni* V. & S.  
 \* \* *Turbonilla formosa* V. & S.  
 \* \* *Turbonilla Smithii* Verrill.  
 \* E. N. *Eulimella ventricosa* (Forbes).  
 \* \* *Odostomia (Menestho) sulcata* V.  
 N. E. *Odostomia unidentata* (Mont.).  
 \* E. *Auriculina insculpta* ? (Mont.) G. O. Sars.  
 \* N. E. *Diaphana nitidula* (Lovén).  
 N. E. *Diaphana pertensis* (Migh.) V.  
 \* \* *Diaphana gemma* V.  
 \* E. *Diaphana conulus* (Desh.).  
 \* E. *Amphisphyra globosa* Lovén.  
 N. S. *Amphisphyra pellucida* (Br.) Lovén.  
 N. *Cylichna Gouldii* (Couth.) V.  
 \* \* *Philine amabilis* Verrill.  
 \* E. N. *Philine Finnarchica* Sars.  
 \* E. N. *Philine fragilis* G. O. Sars.  
 \* E. N. *Philine cingulata* G. O. Sars.
- \* \* *Pleurobranchaea tarda* V.  
 \* \* N. *Dendronotus elegans* V.  
 \* \* *Doris complanata* V.  
 \* \* S. *Polycerella Emertonii* V.  
 \* \* N. *Coryphella nobilis* V.  
 N. *Coryphella Stimpsoni* V.  
 M. *Faculina Bostoniensis* (Couth.) V. & Em.  
 M. *Faculina pilata* (Gould) V. & Em.  
 \* \* N. *Cratena Veronicæ* V.  
 M. *Cratena gymnota* (Couth.) V. & Em.  
 \* N. E. *Tergipes despectus* (Johnst.) A. & H.  
 N. E. *Galvinia exigua* A. & H.  
 \* N. E. G. *Acmæa rubella* (Fabr.) Dall.  
 \* O. *Atlanta Peronii* (Les.).  
 \* O. *Carinaria Atlantica* Ad. & R.  
 \* O. *Carolina longirostris* (Les.).  
 \* O. *Carolina uncinata* (Gray).  
 \* O. *Carolina inflexa* (Les.) Gray.  
 \* O. *Clio pyramidata* Linné.  
 \* O. *Balantium recurvum* Children.  
 \* O. *Styliola acicula* (Rang).  
 \* O. *Styliola virgula* (Rang).  
 \* O. *Spirialis MacAndrei* Forbes & Han.  
 \* \* O. *Cymbulia calceolus* V.  
 N. *Halopsyche globulosa* (Rang) V.  
 N. E. *Dentalium occidentale* Stimpson.  
 \* N. E. *Siphonodentalium vitreum* Sars.  
 \* N. E. *Siphonentalis affinis* Sars.  
 \* E. *Siphonentalis Lofotensis* G. O. Sars.  
 \* E. *Cadulus propinquus* G. O. Sars.  
 \* E. *Cadulus Jeffreysii* (Monteros.).  
 \* \* *Cadulus Pandionis* V. & S.  
 \* E. *Poromya rotundata* Jeff.  
 \* N. E. *Poromya granulata* (Nyst) Forbes & H.  
 \* E. *Lyonsiella abyssicola* Sars.  
 \* \* *Lyonsiella gemma* Verrill.  
 \* N. E. *Kennerlia glacialis* (Leach) Carp.  
 \* N. E. *Neæra glacialis* G. O. Sars.  
 N. E. *Neæra arctica* Lovén.  
 N. E. *Neæra obesa* Lovén (= *N. pellucida* St.).  
 \* E. *Neæra jugosa* S. Wood.  
 \* E. *Neæra rostrata* (Speng.) Lovén.  
 \* \* *Neæra multicosata* V. & S.  
 \* \* *Cardium*, sp. ind.  
 \* E. *Tellinmya ferruginosa* (Mont.).  
 \* E. *Cryptodon Sarsii* (Phil.).  
 M. *Cryptodon obesus* Verrill.  
 \* E. *Cryptodon ferruginosus* ? (Forbes).  
 \* \* N. S. *Loripes lens* V. & S.

N. E. *Astarte crenata* Gray (= *A. lens* Stimp.).  
 \* S. *Leda unca* Gould.  
 \* N. E. *Leda pernula* (Müll.).  
 \* E. *Yoldia expansa* Jeff. ?  
 \* N. E. *Yoldia frigida* Torell.  
 \* N. G. E. *Arca glacialis* Gray.  
 N. E. *Arca pectunculoides* Scacchi.  
 \* E. *Limopsis cristata* Jeff. ?

\* E. *Limopsis minuta* (Phil.).  
 \* \* *Modiola polita* V. & S.  
 \* S. *Aricula hirundo*? var. *nitida* V.  
 \* N. E. *Pecten vitreus* (Gmel.) Wood.  
 N. E. *Pecten Hoskynsi* Forbes, var. *pustulosus* V.  
 \* E. *Pecten fenestratus* Forbes?  
 \* \* *Pecten*, sp. (near *opercularis*).  
 \* E. *Limwa subovata* (Jeff.) Monter.

PART III.—CATALOGUE OF MOLLUSCA RECENTLY ADDED TO THE FAUNA OF SOUTHERN NEW ENGLAND.

By A. E. VERRILL.

The following lists include 130 species of Mollusca that have recently been added to the fauna of Southern New England, mainly through the researches of the dredging party of the United States Fish Commission on the steamer "Fish Hawk". The greater portion of these, with several others undetermined or not yet described, were taken on September 4 and 13 and October 2, on the outer bank or slope, 70 to 115 miles south from Martha's Vineyard and Newport, R. I., in 65 to 500 fathoms. For a list of these localities see p. —.

In these lists those species which were unrecorded from or entirely new to New England or to the northeastern coast of America are indicated by an asterisk; previously undescribed species by two asterisks; those known previously from our northern coasts have N prefixed; those from the middle parts of the coast have M, and are neither specially southern nor northern; those oceanic species belonging to the surface fauna have O prefixed; southern forms are designated by S; those that are also known from Europe are designated by E; those peculiar to America by A.

In the tables, living specimens are indicated by an *asterisk*; dead ones by a *dagger*; *m* signifies many; *sv*, several; *r*, rare; *l*, unusually large; *j*, young.

List of Mollusca from the outer banks previously unknown south of Cape Cod.

Stations .....		865 to 867	872 to 874	870 to 878	869	879 880 895	893 894	891 892
Depths in fathoms.....		64 to 65	85 to 100	115 to 155	192	225 to 252	365 to 372	487 to 500
CEPHALOPODA.								
** <i>Calliteuthis reversa</i> Verrill .....							* 1	
** <i>Heteroteuthis tenera</i> Verrill .....		* m.	* m.	* m.	* m.	* sv.		
N. A. <i>Rossia sublevis</i> Verrill .....				* 2	* sv.	* 3	* 2	
N. E. <i>Octopus Bahndi</i> Verrill .....			*	* sv.	* sv.	* sv.	* sv.	* 1
** <i>Alloposus mollis</i> Verrill .....						* 3	* 2	* 1
* O. E. <i>Argonauta Argo</i> Linné .....		†		†				† 3

## List of Mollusca previously unknown south of Cape Cod—Continued.

Stations .....		865 to 867	872 to 874	870 to 878	869	879 880 895	893 894	891 892
Depths in fathoms .....		64 to 65	85 to 100	115 to 155	192	225 to 252	365 to 372	487 to 500
GASTROPODA.								
N. E.	Admete Couthouyi Jay (= A. viridula Gld.) .....			* sv.	* m.	* sv.	* sv.	* m.
**	Pleurotoma Pandionis V. ....					* 1		
**	Pleurotoma Agassizii V. & S. ....		† 1	* 2	† 1	* sv.	* m.	* m.
	Pleurotoma Carpenteri V. & S. ....							
* N. E.	Bela impressa Mörch (27 to 29 fathoms) .....						* 3	
* N. E.	Bela tenuicostata Sars. ....						† 1	
* N. E.	Bela simplex Midd. (smooth) .....							* sv.
**	Bela hebes Verrill .....							
N. E.	Bela violacea (Migh.) Ad. (27 to 29 fathoms) .....					* 1	* 2	* 1
N. E.	Bela exarata (Möll.) Ad. ....							* 1
**	Taranis pulchella V. ....						† 2	
* N. E.	Taranis Mörchii Sars. ....							
**s.	Marginella roscida? Rav. ....	† 1						
N. A.	Neptunea decemcostata (Say) Ad. ....	† 1		† sv.				
* N. E.	Neptunea propinqua (Alder) .....	†	† sv.	* m.	* m.	* m.	* m.	
**	Neptunea arata V. & S. ....		† sv.	* sv.	* sv.	* sv.	* 1	
**	Neptunea cæata V. ....					* sv.	* m.	* m.
* N. E.	Tritonofusus latericeus (Möll.) Mörch. ....					* sv.	† sv.	
**	Nassa nigrolabra V. ....			* 1				
N. E.	Anachis costulata (Cant.) .....				* m.	* sv.	* m.	
N. E.	Lunatia Grönlandica (Möll.) Ad. ....		† 1	† sv.	† sv.	† sv.	* sv.	
N. E.	Lunatia nana (Möll.) (27 to 29 fathoms) .....							
** N.	Lunatia levicula V. (27 to 29 fathoms) .....							
**	Lamellaria pellucida V. ....		* sv.	* sv.				
* N. E.	Cingula Jan-Mayeni (Friele) V. ....					* 1	* m.	* m.
N. A.	Cingula carinata Migh. ....		* 2	* 2				
** N.	Cingula harpa V. ....						† 2	* 1
* N. E.	Cingula turgida (Jeff.) .....							† 1
** N.	Lovenella Whiteavesii Verrill .....						* 2	* sv.
N. A.	Aporrhais occidentalis Beck. ....		† 1	* m.	† 2	† 2	† 2	
N. E.	Torellia vesita Jeff. ....		† 1	* sv.	* 1			
**	Lepetella tubicola V. & S. ....			† 1	* m.	* 3	* m.	
* N. E.	Acmea rubella (Fabr.) .....						† 1	
**	Scalaria Dalliana V. & S. ....		† 1	* sv.	* 3			
**	Scalaria Pourtalesii V. & S. ....		* 1	† sv.				
*	Scalaria (sp. ind.) .....		* 1					
**	Aclis gracilis V. ....						† 2	* 1
**	Solarium boreale V. & S. ....			* 1				
* N.	Aclis striata V. ....			† 1				
* N. E.	Aclis Walleri J. ....						* 3	* 1
N. E.	Calliostoma occidentale (Migh.) .....		†	* m.	* m.	* m.	* 1	
**	Calliostoma Bairdii V. & S. ....			† sv.		* m.	* m.	* m.
**	Margarita regalis V. & S. ....		† 1	† 1				
**	Margarita lamellosa V. & S. ....							
* E.	Cyclostrema trochoides (J.) .....						* 2	† 2
* E.	Puncturella noachina (L.) Lowe .....					* 1		
* E.	Eulima intermedia Cant. ....			* sv.				
* E.	Eulima distorta Desh. ....			* 1				
N. A.	Turbonilla nivea (St.) Ad. ....			* 1				
**	Turbonilla Rathbuni V. & S. ....				* sv.	* sv.	* 1	
**	Turbonilla formosa V. & S. ....							* sv.
**	Turbonilla Smithii V. ....		* 1	* sv.				
**	Odostomia sulcata V. ....			† 1				
N. E.	Odostomia unidentata (Mont.) .....			† 1				
* E.	Aviculinia insculpta? (Mont.) Sars. ....							
* N. E.	Eulimella ventricosa Forbes. ....		* 1					
N. A.	Ritigicula nitida V. ....			* sv.		* sv.	* sv.	† 2
N. E.	Scaphander puncto-striata (Migh.) Ad. ....			* m.	* sv.	* m.	* m.	* sv.
* N. E.	Philine Finnarchica Sars. ....							
* N. E.	Philine cingulata Sars. ....						* 1	* 1
**	Philine amabilis V. ....			* sv.				
* E.	Amphisphyræ globosa Lovén .....			† 4			† 3	
N. E.	Amphisphyræ pellucida (Brown) Lovén .....			† 2			* 1	
**	Diaphana gemma V. ....							
* E.	Diaphana conulus (Desh.) V. ....			* 1				
* N. E.	Diaphana nitidula (Lov.) .....						* 4	* sv.
N. E.	Diaphana pertenuis (Mighels) .....						† 1	
N. E.	Cylichna ocellata (Migh.) Ad. ....						* sv.	* sv.
**	Pleurobranchæa tarda V. (27 fathoms) .....	* m.	* m.	* m.	*	* 1		
**	Doris complanata V. ....		* sv.					
* O.	Carinaria Atlantica Ad. & E. ....	†						



## List of Mollusca previously unknown south of Cape Cod—Continued.

Stations .....		865 to 867	872 to 874	870 to 878	869	879 880 895	893 894	891 892
Depths in fathoms .....		64 to 65	85 to 100	115 to 155	192	225 to 252	365 to 372	487 to 500
PTEROPODA.								
**	Cymbulia calceolus V.			*		* m.		* 2
* O.	Cavolina uncinata (D'Orb.) Gray.	† 2		† 2			† sv.	† 1
* O.	Cavolina longirostris (Les.)	† 1		† sv.			† sv.	† sv.
* O.	Cavolina inflexa (Les.) Gray							† 1
* O.	Clio pyramidata Linné	† 1					† 2	† 2
* O.	Balanium recurvum Children	† 1			† 1			
* O.	Spirialis MacAndrei Forbes						† 3	† sv.
SOLENOCONCHA.								
N. E.	Dentalium occidentale Stimp. (= D. abyssorum Sars)		† 2	* sv.	* sv.	* †	* sv.	* m.
*	Dentalium (slender var)						† sv.	† sv.
**	Cadulus Pandionis V. & S.		* sv.	* m.	* sv.		† 2	† 1
* E.	Cadulus Jeffreysii (Monteros.)			* m.				
* E.	Cadulus propinquus G. O. Sars			* sv.				
N. E.	Siphonodentalium vitreum Sars							† 1
* N. E.	Siphonentalis Lofotensis Sars.							† 2
LAMELLIBRANCHIATA.								
N. E.	Saxicava Norvegica (Speng.) Woodw.		†	†				
N. E.	Cyrtodaria siliqua (Speng.) Woodw.	†		†				
* N. E.	Poromya granulata (Nyst) F. & Han	* 1						
* N. E.	Poromya rotundata Jeff.	* 2		* 1				
N. E.	Neera obesa Lovén (= N. pellucida St.)	* sv.	* m.	* m.	* 1		* sv.	* m.
N. E.	Neera arctica Lovén				* sv.	* m.	* sv.	
* N. E.	Neera glacialis G. O. Sars.				* sv.	* sv.	* m.	* 2
* E.	Neera rostrata (Speng.) Lovén		* sv.	* sv.			* sv.	†
* E.	Neera jugosa S. Wood						* 2	
**	Neera multicostata V. & S.		* sv.	* sv.				
* E.	Lyonsiella abyssicola Sars				* 2	* 1	* sv.	* sv.
**	Lyonsiella gemma V.							† 1
* N. E.	Kennerlia glacialis (Leach.) Carp		* 2					
N. E.	Cardium Islandicum Linné	† sv.		† 1				
**	Cardium, sp. n. (cancellated)							
** N.	Loripes lens V. & S.	† m.	* m.	* m.	† 1			
* N.	Cryptodon ferruginosus (Forbes)			*			* sv.	* sv.
* E.	Tellinys ferruginosa (Mont.)						* sv.	* sv.
N. E.	Astarte crenata Gray (= A. lens St., var.)	* m.	* m.	* m.	* sv.	* m.	* m.	* 1
N. E.	Nucula delphinodonta Mighels.		* sv.	* sv.		* 1	* sv.	
* E.	Yoldia expansa Jeff. (?)						* 2	
N. E.	Yoldia lucida Lovén			*	* sv.	* sv.	* m.	* 2
* N. E.	Yoldia frigida Torell						* sv.	
N.	Yoldia thraciformis (Storer) Stimp.			† 1	* sv.	* sv.		
* S.	Leda unca Gld	† sv.	* m.	* m.				
* E.	Limopsis cristata Jeff. ?	† 1		† 3				
* E.	Limopsis minuta (Phil.)			* sv.			* m.	* 3
N. E.	Arca glacialis Gray		* m.	* m.	* m.	* m.	* m.	* sv.
N. E.	Arca pectunculoides Sc. (? var. of last)		* m.	* m.			* m.	
N. E.	Arca, var. septentrionalis.			*			* sv.	
**	Modiola polita V. & S.					* 2		
N. E.	Crenella decussata (Mont.) Macg		* r.	* r.				
N. E.	Dacrydium vitreum (Möhl.) Torell						* m.	* m.
* S.	Avicula hirundo? var. nitida V.	* m.	* 2	* 2	* 1			
N. E.	Pecten Islandicus Müller		† r.	† sv.				
**	Pecten (near opercularis)			†				
* N. E.	Pecten vitreus (Gmel.) Wood.	* r.			* sv.	* m.	* m.	
* N. E.	Pecten vitreus, var. abyssorum					*		
N. E.	Pecten Hoskynsi Forbes, var. pustulosus V.			* 1			* r.	
* E.	Pecten fenestratus Forbes? = inequisculptus Tib.		* 1	* 1				
* E.	Limæa subovata (Jeff.) Monteros					* 1	* m.	* sv.
BRACHIOPODA.								
N. E.	Terebratulina septentrionalis (Couth.) (789 sv.)				* 1		* m.	



List of Mollusca from the outer banks previously known from the shallow waters south of Cape Cod.

Stations .....		865 to 867	872 to 874	870 to 878	869	879 880 895	893 894	891 892
Depths in fathoms .....		64 to 65	85 to 100	115 to 153	192	225 to 252	365 to 372	487 to 500
CEPHALOPODA.								
N. A.	Ommastrephes illecebrosa (Les.) V .....	* 1					* 2	
GASTROPODA.								
N. E.	Bela pyramidalis (Ström) .....			† 1				
N. E.	Buccinum undatum Linné .....			† 1				
N. A.	Neptunea Stimpsoni (Mörch) .....		† 1					
N. A.	Siphonella pygmaea (Gld.) V .....	†	† m.	* m.	* sv.	* sv.	* m.	
M. A.	Tritia trivittata (Say) Ad .....		* 1					† 1
N. E.	Astyris rosacea (Gld.) Ad .....	† 2	*	* m.	* 1			
N. A.	Astyris zonalis (Lins.) V .....			* m.			* m.	* m.
N. E.	Natica clausa Brod. & Sowerby .....			† sv.	† 2	* sv.	* sv.	* sv.
S. A.	Neverita duplicata (Say) Stimp .....			† 1				
M. A.	Lunatia heros, var. (wide umb.) .....		* †	† sv.		†		
M. A.	Lunatia heros, var. triseriata (Say) .....	† 1	† 1	† 3				
M. A.	Crucibulum striatum (Say) Ad .....		† 1	† 1				
M. A.	Crepidula plana Say .....			† 1				* † 2
N. E.	Macleroplax obscura (Couth.) Friele .....				† 1		* sv.	
S. A.	Turbonilla interrupta? Ad .....		† 1					
N. E.	Philine quadrata (Wood) Forb. & Han .....			† 1				* 1
N. E.	Cylichna alba (Brown) Lovén .....			* sv.			†	
N. E.	Dendronotus robustus V .....				* 1			
PTEROPODA.								
O. E.	Cavolina tridentata Gray .....	†	† sv.	† m.	† sv.	† m.	† sv.	† m.
O. E.	Diacria trispinosa Gray .....	†		†			†	† sv.
SOLENOCONCHA.								
N. E.	Dentalium striolatum Stimp .....			†				
LAMELLIBRANCHIATA.								
N. E.	Teredo megotara Hanley .....		* m.			* m.		
M. A.	Ensatella Americana (Gld.) V .....	† 3						
M. A.	Clidiophora trilineata (Say) Carp .....	† 1		† 1				
M. A.	Periploma papyracea (Say) V .....		* 2	* sv.		* sv.		
M. A.	Thracia Conradi Couth .....	† sv.	† 2	† sv.				
M. A.	Spisula solidissima? Gray .....	† 1						
M. A.	Ceronia arctata (Con.) Ad .....	† sv.	† sv.	† sv.	*		† sv.	
N. E.	Macoma sabulosa (Spong.) Mörch .....		† 1	† sv.				
N. E.	Cyprina Islandica (Linné) Lam .....		† 1	* sv.				
M. A.	Callista convexa (Say) Ad .....		†	†				
M. A.	Cardium pinnulatum Conrad .....		†	* m.				
M. A.	Lucina filosa Stimp .....	† m.	†	* m.				
M. E.	Cryptodon Gouldii (Phil.) Stimp .....			*				
M. A.	Cryptodon obesus V .....	† sv.	† sv.	† m.	†			
M. A.	Solemya velum Say .....			† 1				
M. A.	Venericardia borealis (Con.) Carp .....	* m.	* m.	* m.	* 1 †			
M. A.	Astarte castanea Say .....	†						
M. A.	Astarte quadrans Gld .....	†						
M. A.	Astarte undata Gld .....	† m.	* m.	* 1				
M. A.	Nucula proxima Say .....		* sv.	*		* sv.		
N. E.	Yoldia sapotilla (Gld.) Stimp .....	* sv.	* m.	* m.	†			
M. E.	Modiola modiolus (Linné) Turton .....			* 1				
M. A.	Crenella glandula (Totten) Ad .....	†						
M. A.	Pecten tenuicostatus Migh .....	* m.	* sv.	† sv.				
N. E.	Anomia aculeata Müll .....	* m.	* sv.	* sv.	*			

*List of recent additions to shallow-water Mollusca of Southern New England.\***Parasira catenulata* Steenstrup. Oceanic. Mediterranean.\**Truncatula truncatulus* (Drap.). Littoral. European.*Littorina littorea*. Littoral; abundant. European.\**Assiminea Grayana* Leach. Littoral. European.*Ancula cristata* Lovén. Northern and European.\*\**Polycerella Emertoni* Verrill. Littoral.*Scyllaea Edwardsii* Verrill. Littoral. Southern and oceanic.*Coryphella Mananensis* (Stimp.) Verrill. Off Race Point, Long Island Sound, 40 fathoms.*Stiliger fuscata*, (Gld.) Bergh. Massachusetts Bay.*Terebratulina septentrionalis* (Couth.). Off Block Island, 15 fathoms. Northern.**DESCRIPTION OF A NEW SPECIES OF NEMICHTHYS (NEMICHTHYS AVOCETTA), FROM PUGET SOUND.****By DAVID S. JORDAN and CHARLES H. GILBERT.*****Nemichthys avocetta*, sp. nov.**

Color translucent white, the lower half of the body covered with small, round, black spots, sharply defined; among these some smaller spots. Belly near the median line black. Upper half of body plain, colorless. Pectorals and dorsal plain. Anal speckled.

Body band-shaped, but not strongly compressed; deepest in the middle, tapering behind to the long and very slender filament-like tail, and anteriorly to a very long and slender neck, which contracts immediately behind the head. Skin smooth. No lateral line.

Head proper small, short and rather broad; concave between the eyes, with two median ridges; full and broad behind the eyes, with three longitudinal ridges. Lower part of head narrow, sharp, so that the head would be triangular in a vertical section. Eye very large, vertically placed, its length one-third that of the head without snout. Nostrils each simple (two on each side), rather large, close in front of eye, without tube or flap. Maxillary extending to close behind the eye, the mandible somewhat farther. Jaws prolonged, becoming very slender, long, acuminate, needle-like at tip, somewhat recurved. Upper jaw the longer, and nearly four times the length of the rest of the head, being 7-8 times its greatest depth. Both jaws with small, very numer-

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\* Some of the species here included were discovered in 1875 and 1876, and have been recorded in the American Journal of Science. Those with an asterisk prefixed were first discovered on our coast this season, or else have not been previously recorded. For additional species, not included in my Report on Invertebrates of Vineyard Sound, &c., 1873, see American Journal of Science, x, pp. 40, 41, July, 1876.

ous, retrorse, close-set, sharp teeth. Jaws bony, their lateral surfaces with retrorse roughnesses. Head naked, covered with skin.

Gill-openings rather large, oblique, running downward and forward, separated by a rather narrow isthmus. Pectorals well developed, half longer than eye. No ventrals. Vent under middle of the length of the pectorals (when depressed); the anal fin beginning close behind it and extending to the tail; its rays soft and rather slender; the membrane delicate; its height greatest near the middle and anteriorly, where it is somewhat less than height of body, becoming obsolete on the long caudal filament. Dorsal similar to anal, but lower, beginning close behind the occiput and running to the tail.

*Table of measurements.*

	Inches	100ths of length.
Extreme length.....	21.40	100
Body:		
Greatest depth.....	.33	1.6
Depth at neck.....	.15	.8
Head:		
Greatest length.....	2.10	10
Greatest depth.....	.25	1.2
Length of snout.....	1.70	7.6
Diameter of orbit.....	.18	1
Anal:		
Greatest height.....	.28	1.3
Pectoral:		
Length.....	.30	1.5

The specimen which is the type of the present description was taken in May, 1880, in the harbor of Port Gamble, and was placed by its captor in the museum of the University of Washington Territory, at Seattle. The president of the university, Prof. A. J. Anderson, presented it to the United States National Museum. Its movements in the water are said to be extremely active.

Fishes of this type offer comparatively few specific characters, and we are able to separate this species from *Nemichthys scolopaceus* Rich. of the Atlantic by differences in proportion only. According to the detailed description and figure of the latter species given by Lowe and Brandt (*Leptorhynchus* or *Belonopsis leuchtenbergi*, Mém. Acad. St. Pétersb. Sav. Étrang., 1854, vii, 171-174), *Nemichthys avocetta* is distinguished by the much slenderer head, longer beak, and higher anal fin, the greatest height of the latter being nearly equal to the length of the pectoral and more than the depth of the head. So far as known to us, this is the first species of the genus thus far taken in the Pacific. A recent newspaper account of the capture of a sea-serpent at Victoria, British Columbia, perhaps refers to a second example of the same species.

SEATTLE, WASH., June 10, 1880.

**DESCRIPTION OF A NEW SPECIES OF PARALEPIS (PARALEPIS CORUSCANS), FROM THE STRAITS OF JUAN DE FUCA.**

**By DAVID S. JORDAN and CHARLES H. GILBERT.**

*Paralepis coruscans*, sp. nov.

Allied to *P. borealis* Reinh.

Head and body very elongate, compressed, almost ribbon-shaped, of uniform width throughout, and preserving its depth forwards to occiput and backwards to origin of dorsal fin. From the insertion of the dorsal the body is gradually narrowed to the very slender caudal peduncle, the base of anterior portion of anal projecting much beyond the ventral outline.

Abdomen compressed, subtrenchant.

Head long, wedge-shaped, its upper and lower outlines equally oblique. Snout very long and sharp, equaling half the length of the head, its tip on a line with the axis of the body. Eye large, its diameter one-third the length of the snout, placed high, with its upper margin on a level with the top of the head.

Head shaped somewhat as in *Sphyræna*. Jaws equal; gape very wide; maxillary reaching the vertical from the nostril; mandibular joint reaching the vertical from the anterior margin of the pupil.

Mandible closing inside the margins of the upper jaw, the latter being transversely much arched to receive it; tip of mandible fitting into an emargination between the intermaxillaries.

None of the teeth very large or fang-like. Intermaxillaries laterally with a single series of exceedingly minute teeth (as in *Engraulis*); anteriorly, however, on each side is a series of 4 or 5 rather long acicular teeth; the entire intermaxillary series is outside of the mandible in the closed mouth. Vomer with minute teeth. Palatine series long; the anterior teeth long and slender; the posterior short. Mandibular series working against the palatines; the teeth slender, distant, of different lengths.

Branches of the lower jaw transversely deeply concave. Maxillary and intermaxillary slender, intimately connected, sliding under a fold of the skin.

All the bones of the head very thin, flexible, membrane-like. Pre-orbital long, very narrow, arched, extending forwards from orbit, reaching maxillary midway of its length. Snorbital chain likewise narrow.

Head with numerous sharp ridges; two forwards from the orbit; two pairs on the top of the head, converging forwards. Orbital ring slightly raised. Preopercular margin very oblique. Opercle with concentric striæ and radiating lines.

Gill-openings very wide, extending forwards to vertical from nostril; isthmus anteriorly much compressed, thin and membrane-like, the gills of the two sides lapping over and meeting across the ridge. Mandibular rami and subopercles and interopercles of the two sides meeting below across the isthmus.



Gill-rakers similar on all the arches, short, immovable, much broader than long, each provided with 4 or 5 short needle-like spines. A slit behind fourth gill. Pseudobranchiæ developed, partly hidden by a fold of the membrane. Branchiostegals 7, the membranes overlapping anteriorly, as in the *Salmonidæ*.

Scales small, deciduous; those of the lateral line large, non-imbricate, plate-like, becoming smaller posteriorly, the series terminating abruptly opposite middle of the base of the anal.

Fins all very small. Pectorals placed low, their length two-fifths that of the snout. Ventrals far back, entirely behind the dorsal, their distance from base of caudal half that from front of orbit. Distance from middle of dorsal basis to base of caudal half its distance from the tip of the snout.

Anal elongate, high anteriorly, its base terminating at a point distant one-half diameter of orbit from base of caudal. Adipose dorsal high and narrow, directly over the end of the anal.

Caudal small, widely forked, the middle rays two-fifths the length of longest. End of caudal peduncle emarginate, the caudal rays radiating from the upper and lower angles. (In the type specimen the two lobes of caudal are entirely separate, without trace of connecting membrane.) Rudimentary rays long, extending along upper and lower sides of caudal peduncle for a distance greater than diameter of orbit. Tips of adipose dorsal and posterior anal rays reach rudimentary caudal rays.

Dorsal rays 8; anal rays 31; pectoral rays 11; ventral rays 9; lateral plates 60. Vent slightly behind base of ventral fins.

Color, in spirits, light olive-brown, becoming darker on the back, belly, and towards the tail. Above with a few small, distinct, black dots. Sides with some light brownish-yellow shading, a very narrow, lengthwise, silvery streak along the middle of the abdomen. Base of pectoral silvery, with a dark spot above. Bases of other fins jet-black, the color usually extending on the bases of the rays.

Sides of head silvery; opercles, top of head, and tip of snout dark; mandibular rami bright silvery, and provided each with a double series of minute "phosphorescent" spots.

This species is known to us from a single specimen obtained in the harbor of Port Townsend, Wash., by Mr. Brown, assistant in the custom-office at Port Townsend, and by him presented to the United States National Museum. The type is  $9\frac{1}{4}$  inches in length, and is in good condition.



Table of measurements.

Collector's number of specimen. Locality	150 Port Townsend, Wash.	
	Inches and 100ths.	100ths of length.
Extreme length	9.25	.....
Length to end of middle caudal rays	8.75	.....
Body:		
Greatest height		7 $\frac{3}{4}$
Height at ventrals		6 $\frac{1}{2}$
Least height of tail		2 $\frac{1}{2}$
Head:		
Greatest length		23 $\frac{1}{2}$
Width of interorbital area		2 $\frac{1}{2}$
Length of snout		11 $\frac{1}{2}$
Length of maxillary		9
Length of mandible		12 $\frac{1}{2}$
Diameter of orbit		3 $\frac{1}{2}$
Dorsal (rayed):		
Distance from snout		55 $\frac{1}{2}$
Length of base		2 $\frac{1}{2}$
Height at fourth ray		5
Dorsal (adipose):		
Distance from dorsal		29 $\frac{1}{2}$
Height at longest ray		2 $\frac{1}{2}$
Anal:		
Distance from ventral base		11 $\frac{1}{2}$
Length of base		15
Height at longest ray (ca.)		6
Caudal:		
Length of middle rays		2 $\frac{1}{2}$
Length of external rays		6
Pectoral:		
Distance from snout		24
Distance from dorsal outline		5 $\frac{1}{2}$
Length		5
Ventral:		
Distance from snout		59 $\frac{1}{2}$
Length		3 $\frac{1}{2}$
Branchiostegals		7
Dorsal		8
Anal		31
Pectoral		11
Ventral		9
Number of scales in lateral line		60

PORT TOWNSEND, WASH., *September 30, 1880.*

**PRELIMINARY NOTICE OF THE CRUSTACEA DREDGED, IN 64 TO 325 FATHOMS, OFF THE SOUTH COAST OF NEW ENGLAND, BY THE UNITED STATES FISH COMMISSION IN 1880.**

By S. I. SMITH.

A general account of three short dredging trips of the United States steamer Fish Hawk to the region, off the eastern end of Long Island, known as the Block Island soundings, has already been given by Professor Verrill in these Proceedings, and also in the American Journal of Science for the present month (vol. xx, pp. 390-403), and need not be repeated here, further than that the region examined is in latitude 39° 46' to 40° 03' north, longitude 70° 22' to 71° 10' west, and that on the first trip, September 3 to 5, eight hauls (stations 865 to 872) were made, at depths ranging from 64 to 192 fathoms; on the second trip, September 12 to 14, nine hauls (stations 873 to 881) were made, in 85 to 325 fathoms;

and on the third trip, October 1 to 3, five hauls (stations 891 to 895) were made, in 238 to about 500 fathoms. At station 872, 86 fathoms, the bottom was covered with shells and sponges, but at all the other stations it was composed of fine sand and mud, varying in proportions and in compactness. The collections from the last trip have not yet been fully examined, and only a few of the species are recorded in the following pages. There was, however, a much smaller number of crustaceans obtained upon this last trip than upon the others.

The wonderful richness of the fauna of the sea-bottom in this region, in mollusks and echinoderms, has been shown in Professor Verrill's papers just referred to, and it is not less remarkable as regards the crustaceans. The richness, in both species and individuals, of this crustacean fauna would never have been suspected, and scarcely dreamed of, by one accustomed only to the meager fauna of the shallower waters of the south coast of New England. The larger part of the species secured from the great masses of material brought up in the trawl and dredge are Decapoda. There are comparatively few small species of Schizopoda, Cumacea, and Amphipoda, and further dredging will undoubtedly increase very greatly the number of species in these groups. The following enumeration is not complete even for the Decapoda, and much less so for the other groups, as several of the species are represented by specimens insufficient for proper determination, while others are omitted because not yet satisfactorily determined.

The exact location, depth, character of bottom, and temperature for each of the stations are given by Professor Verrill in the papers above referred to, and in the following pages I give only the serial numbers of the stations at which the species occurred, and the range in depth from the shallowest to the deepest of these stations. In occasionally referring to localities of dredgings carried on by the Fish Commission in previous years, I give the serial numbers of the stations according to the "Lists of the Dredging Stations of the United States Fish Commission from 1871 to 1879, inclusive, with Temperature and other Observations, arranged by Sanderson Smith and Richard Rathbun", in the Commissioner's Report for 1879.

## BRACHYURA.

### *Hyas coarctatus* Leach.

Several specimens from 86 fathoms, station 872, and 115 fathoms, station 871.

*Collodes depressus* A. Milne-Edwards, Crust. Région Mexicaine, p. 176, pl. 32, fig. 4, 1878.

I refer to this species a considerable number of specimens from stations 865, 871, 872, 873, 874, 875, 878; 65 to 142 fathoms. Most of these specimens are much larger than those described by Milne-Edwards, and in all the larger, and in some of the smaller, specimens examined the three dorsal spines of the carapax and abdomen are almost wholly obsolete,

but in other respects they all agree well with the figures. In a few of the smallest specimens examined the spines are very nearly or quite as prominent as in the figures, while in other respects they are indistinguishable from specimens of the same size in which the spines are very small and inconspicuous. In all the spineless specimens there is a more or less prominent tubercle in place of the spines of the carapax. As in the next species, the spines are probably specially characteristic of the young, and become more or less obsolete as the individual increases in size, the obsolescence being more rapid in some individuals than in others. I think there is very little doubt that this species is synonymous with *C. trispinosus* Stimpson, also described from very small specimens. The following measurements show the size of the specimens examined. In the largest males the chelæ\* are stout, but little more than twice as long as broad, and the basal portion considerably swollen.

Station.	Sex.	Length of carapax.	Breadth of carapax.	Ratio.
		<i>mm.</i>	<i>mm.</i>	
874 .....	♂	10.0	7.9	1: 0.79
871 .....		12.0	8.7	1: 0.73
865 .....		14.3	11.0	1: 0.76
871 .....		14.7	12.2	1: 0.77
874 .....		17.5	14.0	1: 0.80
873 .....	♀	8.2	5.7	1: 0.70
871 .....		11.0	8.0	1: 0.73
865 .....		13.1	10.3	1: 0.78
878 .....		14.0	11.0	1: 0.78

*Euprognatha rastellifera* Stimpson, Bull. Mus. Comp. Zool. Cambridge, ii, p. 123, 1870.—A. Milne-Edwards, Crust. Région Mexicaine, p. 183, pl. 33, fig. 2, 1878.

Stations 865, 869, 871, 872, 873, 874, 877, 878; 65 to 192 fathoms; at nearly all these stations in vast numbers.

Many of the specimens are much larger than those described by Stimpson and Milne-Edwards, males often being 15<sup>mm</sup> in length of carapax. In all the large specimens the spines of the carapax are much less conspicuous than in the young; the spines upon the orbital arches, upon the gastric, cardiac, and the summits of the branchial regions, and upon the basal segment of the abdomen, are often reduced to low and inconspicuous tubercles. In large males the chelæ are nearly as long as the carapax, more than a fourth as broad as long, and the basal portion considerably swollen. The whole animal is nearly naked and very free from foreign growths of all sorts, contrasting strongly in this respect with most of the Maiioidea.

*Lambrus Verrillii*, sp. nov.

Allied to *L. Pourtalesii* Stimpson.

*Female*.—The carapax, including lateral spines, is about one and a fourth times as broad as long, with a broad longitudinal depression

\* I restrict, as Huxley has done, the term *chela* to the two terminal segments of a chelate appendage.

either side, between the branchial region and the posterior part of the gastric and the cardiac region, and with the surface rough and tuberculose. The cardiac, with the posterior part of the gastric region, is raised into a continuous ridge, capped with a longitudinal line of four large spiniform tubercles, one on the gastric and three on the cardiac, besides a small one in the middle of the posterior margin. The cardiac and the two anterior gastric tubercles are erect and their tips nearly in the same horizontal line, while the posterior cardiac is situated much lower down on the posterior slope of the carapax and is directed upward and backward. In front of the gastric tubercle there are two much smaller ones, in a transverse line, and in front of these there are usually four still smaller ones similarly disposed, so as to make a submedian line of three small tubercles either side, between the large gastric tubercle and the erect and prominent tubercle upon the crest of the orbital arch. In one of the specimens the most anterior of these three pairs of tubercles back of the orbits is obsolete. There is a deep longitudinal depression between the orbits, and extending a little back of them and forward to the narrow part of the rostrum. The rostrum is prominent, directed forward and downward, suddenly contracted just in front of the antennal fossæ, leaving a dentiform tubercle either side, where the rostrum is suddenly narrowed; there is also a small tooth either side, near the tip of the rostrum. The antero-lateral margin is strongly incurved at the cervical suture, so as to approach closely and expose slightly from above the strongly tuberculo-dentate, infero-lateral carina, which is itself slightly incurved at this point; both in front of and behind the cervical suture, however, the margin recedes from the inferior carina, in front being directed upward at an oblique angle with the part behind the cervical suture. Above this angle there is a broad, conspicuous, and nearly smooth depression in the nearly vertical surface. The margin between the cervical suture and the orbit is armed with two small tubercles near the cervical suture, but the anterior two-thirds is unarmed and slightly concave in outline. Behind the cervical suture the margin is regularly and very strongly arcuate, and in front of the great branchial tooth, which really forms the lateral angle of the carapax, is armed with nine or ten teeth, of which the first three or four are small and somewhat tuberculiform; the six posterior are larger, acutely triangular, and strongly lacinated, the four anterior of these six being nearly equal in size, the fifth larger and the sixth smaller than the others. The greatest breadth of the carapax is between the tips of the large fifth lacinated tooth each side, or, excluding the teeth, between the bases of the third and fourth teeth each side. The great branchial tooth is larger than any other, lacinated, and has a small tooth at the base in front and a larger one near the base behind; and still behind this last there is first a small and then a much larger tuberculiform spine on the concave postero-lateral margin, while the short posterior margin is armed with three prominent tubercles, with several smaller ones between. The



branchial regions are prominent, tuberculose, and pitted, particularly upon the outer surface, and rise at the summit into a prominent spiniform tubercle either side, on a line with the anterior cardiac tubercle.

The chelipeds are very nearly as in *L. Pourtalesii*, but appear to be proportionally a little longer, and, judging from A. Milne-Edwards's figure of *Pourtalesii*, to have the marginal teeth more acute and more deeply laciniated. The meri of all the ambulatory legs are spinulose on both the upper and lower edges, as in *Pourtalesii*, while in the last pair there are, in addition, similar spines on the upper edge of the carpus and one near the middle of the upper edge of the propodus. The dactyli are about as long as the corresponding propodi, are very slightly compressed, and are covered with a dense velvet-like pubescence, except at the tips.

*Measurements.*

	♀ (Sta. 865-7.)	♀ (Sta. 872.)	♀ (Sta. 872.)
	<i>mm.</i>	<i>mm.</i>	<i>mm.</i>
Length of carapax.....	24.0	26.5	32.8
Breadth including lateral spines.....	30.0	33.0	41.0
Ratio of length to breadth.....	1: 1.25	1: 1.25	1: 1.25
Breadth excluding lateral spines.....	26.0	28.0	35.3
Length of cheliped fully extended.....	57.0	65.0	85.0
Length of merus of cheliped.....	20.0	25.5	32.0
Length of propodus of cheliped.....	27.0	30.0	39.0

The conspicuous cervical emargination of the antero-lateral margin of the carapax, the cervical depression above the margin, the different antero-lateral margin in front of the cervical suture, and the spines or tubercles on the carpi and propodi of the last ambulatory legs appear clearly to distinguish this species from the *Pourtalesii*. The antero-lateral margin between the cervical suture and orbit appears to be more like *L. hyponcus*, as figured by A. Milne-Edwards, though in other respects the *hyponcus* is unlike the present species.

Stations 865 to 867, 872; 65 and 86 fathoms; three specimens, all females.

*Cancer borealis* Stimpson.—Smith, Trans. Conn. Acad., v, p. 39, pl. 8, 1879.

Stations 865, 871, 872, 875, 877, 878, 879; 65 to 225 fathoms. Most of the specimens are small, and the largest is only 56<sup>mm</sup> in breadth of carapax.

Large specimens of this species were taken in abundance in the shallow waters off Newport.

*Geryon quinquedens* Smith, Trans. Conn. Acad., v, p. 35, pl. 9, figs. 1, 2, 1879.

Stations 881, 893; 252 and 372 fathoms.

This species grows to a much greater size than any of the specimens from which my original description was drawn. A male from 200 fathoms, off Nova Scotia, north latitude 42° 37', west longitude 62° 55', presented to the National Museum by Capt. G. A. Johnson and crew of



the schooner *Augusta A. Johnson*, of Gloucester, Mass., gives the following measurements:

	mm.
Length of carapax, including frontal teeth.....	88.2
Breadth, including lateral teeth.....	101.7
Breadth in front of lateral teeth .....	93.5
Length of posterior legs.....	180.0

*Bathynectes longispina* Stimpson, Bull. Mus. Comp. Zool. Cambridge, ii, p. 146, 1879.—A. Milne-Edwards, Crust. Région Mexicaine, p. 234, pl. 42, fig. 1, 1879,

Stations 871, 872, 874, 879; 85 to 225 fathoms.

Stimpson's and Milne-Edwards's specimens were from the Straits of Florida.

*Acanthocarpus Alexandri* Stimpson, Bull. Mus. Comp. Zool. Cambridge, ii, p. 153, 1870.

Stations 870 to 874, 877, 878; 85 to 155 fathoms. At 878, 142 fathoms, forty-nine specimens were taken.

A large part of the specimens are much larger than those described by Stimpson, which were from 74 fathoms, in Pourtalès's dredgings in the Straits of Florida. A male, from station 878, gives the following measurements: Length of carapax, 16.9<sup>mm</sup>; breadth, 16.8<sup>mm</sup>; breadth between tips of carpal spines, with the chelipeds closed, 42<sup>mm</sup>; length of carpal spine, 8<sup>mm</sup>.

*Ethusa microphthalma*, sp. nov.

*Female*.—The carapax is as broad as long, but very much narrowed anteriorly, so that in front it is only half as broad as the widest part, which is at the swollen branchial regions posteriorly. The front between the orbits is less than half as wide as the entire front, and, as seen from above, is divided by a triangular median sinus and two slightly less deep sinuses at the extremities of the antennular fossæ, and the angles between and outside of these sinuses are spiniform, so that the front between the eyes is armed with four similar and nearly equidistant spines, of which the lateral are slightly more prominent than the median. The orbital sinuses are nearly as deep as broad, and formed on the outside by the spiniform antero-lateral angles, which reach nearly as far forward as the spines of the front. The antero-lateral margins are long and nearly straight. The dorsal surface is slightly convex and not deeply areolated, though the cervical suture is well marked, and the whole surface is granular and slightly pubescent, except on the cardiac and gastric regions, where the granulation is nearly obsolete.

The eyes are small and on very short peduncles, so that they do not nearly reach the angles of the orbital sinuses; the cornea is terminal, not expanded, and the pigment is black.

The chelipeds are equal, small, and very slender; the chela is scarcely stouter than the carpus, the basal portion is smooth and nearly cylindrical, and the digits are alike, fully as long as the basal portion, strongly compressed, longitudinally grooved, slightly curved laterally,

and the prehensile edges straight and very regularly dentate. The two first pairs of ambulatory legs are nearly alike, twice as long as the chelipeds, and nearly or quite naked; the propodus is a little shorter than the merus, very slightly compressed, and smooth, but slightly grooved longitudinally; the dactylus is once and a half as long as the propodus, very much compressed vertically, slightly curved, of nearly uniform breadth to a short distance from the acuminate tip, and very smooth. The third and fourth pairs of ambulatory legs are nearly alike, scarcely half as long as the first and second, slender, and covered with short pubescence, except upon the dactyli. The propodus is much shorter than the merus, not very much shorter than the carpus, nearly cylindrical, and not expanded distally; the dactylus is very short and strongly curved.

The single specimen seen, from station 878 (142 fathoms), gives the following measurements:

	mm.
Length of carapax, including frontal spines.....	13.5
Greatest breadth of carapax .....	14.0
Breadth between antero-lateral spines .....	7.0
Breadth between tips of inner angles of orbital sinuses.....	3.1
Length of cheliped.....	18.0
Length of chela .....	8.0
Breadth of chela .....	1.7
Length of dactylus.....	4.0
Length of second ambulatory leg.....	38.0
Length of its propodus .....	8.0
Length of its dactylus.....	12.0
Length of fourth ambulatory leg.....	18.0
Length of its propodus .....	3.6
Length of its dactylus .....	1.5

The very small eyes and the great breadth and prominent antero-lateral angles of the carapax at once distinguish this species from *E. mascarone*, of the Mediterranean, and from the Japanese *E. sexdentata*. It is also evidently distinct from *E. granulata* Norman, which, however, has apparently not been fully described. The genus has not, I think, been recorded from America before, although a species occurs in the Bay of Panama.

#### ANOMURA.

*Latreillia elegans* Roux, Crust. Méditerranée, pl. 22, 1828.—Milne-Edwards, Hist. Nat. Crust., i, p. 277, 1834.—De Haan, Fauna Japonica, p. 108, 1837.—Lucas, Explor. de l'Algérie, Animaux Articulés, i, p. 3, pl. 1, fig. 1, 1849.—Heller, Crust. südlichen Europa, p. 147, pl. 4, fig. 14 (anterior part of carapax after Lucas).

Station 872, 86 fathoms (three females); 874, 85 fathoms (fragment of carapax).

I have had no European specimens for comparison, and have seen only a tracing of Roux's figure, with which the specimens before me agree well. In these specimens the propodus in the posterior pair of legs is a little more than two-thirds as long as the merus, and the dactylus is very short and closes against the somewhat oblique and spinous

distal extremity of the inferior edge of the propodus, which is ciliated along the rest of its length, while the merus is not ciliated. In Lucas's general figure the propodus is proportionally about a fourth shorter and the dactylus several times as long as in the specimens, the dactylus being very much as in the first three pairs of ambulatory legs; but the enlarged figure, 1 c, of the terminal portion of the posterior leg is very different. The part apparently corresponding to the dactylus in the general figure is represented as composed of two segments, a shorter terminal one like the dactylus in the specimens, and a longer basal one like the terminal part of the propodus. I think there is little doubt that these figures were drawn from a specimen in which the very slender and delicate propodus of the posterior leg was partially broken and bent at about a fourth of the way from the tip to the base, and that the artist mistook the break for a natural articulation, and so represented it. Supposing this to be the case, Lucas's enlarged figure agrees very well with the specimens before me.

**Homola barbata** White, List Crust. British Museum, p. 55, 1847.—*Cancer barbatus* Fabricius, Entomologia Systematica, ii, p. 460, 1793.—Herbst, Krabben und Krebse, pl. 42, fig. 3.—“*Dorippe spinifrons* Lamarek, Animaux sans Vertèbres, v, p. 245, 1818” (Heller).—*Homola spinifrons* Leach, Trans. Linnæan Soc. London, xi, p. 324, 1815; Zoological Miscellany, ii, p. 82, pl. 88, 1815.—Desmarest, Considérat. Générales Crust., p. 134, pl. 17, fig. 1, 1825.—Milne-Edwards, Hist. Nat. Crust., ii, p. 183, pl. 22, figs. 1-4, 1837; Règne Animal de Cuvier, 3<sup>me</sup> édit., pl. 39, fig. 2.

Station 872; 86 fathoms; two males, the larger 19<sup>mm</sup> in length of carapax.

I have had no Mediterranean specimens for comparison, but the two before me agree perfectly with the figures and descriptions above referred to.

**Lyreidus Bairdii**, sp. nov.

*Female*.—The carapax is regularly and strongly convex transversely, about one and three-fourths times as long as the breadth at the antero-lateral angles, back of which it narrows only slightly for half the length of the lateral margins, which then curve regularly round to the articulation with the abdomen. The rostrum, or median tooth of the deeply tridentate front, is acutely triangular, the breadth at base being equal to about half the length and greater than the distance between its tip and that of either of the lateral spines, which are spiniform, very acute, and directed forward. The orbital sinuses left between the median and lateral teeth are nearly as deep as broad and broadly rounded behind. The edge of the antero-lateral margin is rounded, but is armed with a small tubercle about a third of the way from the lateral to the anterior angle, and in front of this tubercle the carapax is suddenly narrowed, so that the margin in front of the tubercle is concave in outline as seen from above. The posterior half of the lateral margin is marked above by a distinct carina, but the anterior half is smoothly rounded.

The eye-stalks scarcely reach the tips of the lateral teeth of the front,

are broad at base, and narrowed to triangular tips. The eyes themselves are very small, black, and situated on the outer and inferior edge of the eye-stalks.

The chelipeds are nearly as long as the carapax, and similar in form to those of *L. tridentatus*. The propodus is short and very much compressed; the distal margin is transverse and nearly as long as the length of the whole segment; the dorsal edge is thin and sharp, and terminates in a sharp tooth near the articulation of the dactylus; back of the thin digital process the inferior edge is armed with three or four acute teeth, decreasing in size proximally. The dactylus is compressed and very thin, with the outer edge regularly curved and sharp; the prehensile edge is sharp and slightly irregular in outline, but not dentate, although the opposing edge of the propodus is armed with about five low teeth inside the lip. The first, second, and fourth pairs of ambulatory legs are very nearly as in *L. tridentatus*, as figured by De Haan. In the third pair, however, the propodus is nearly twice as broad as long, the inferior edge being expanded into a very thin, broad, lamellar process nearly as large as the body of the segment, and with a ciliated and regularly curved margin nearly semicircular in outline. The dactylus is nearly as broad as the propodus, lamellar throughout, articulated at the upper end of the proximal margin, which, below the articulation, is concave in outline and ciliated to match the adjoining lamellar process of the propodus; the lateral margins are naked and convex in outline, except near the tip, which is sharply acuminate.

The abdomen is slightly more than two-thirds as long as the carapax, and agrees very closely with De Haan's figure of the abdomen of the male of *L. tridentatus* in the form and proportions of the somites. In its natural position, the abdomen is bent at the fourth somite, and this somite is armed with a small spiniform tubercle, projecting from the middle of the dorsal surface.

The dorsal surface of the carapax and of the abdomen, the sternum, and the exposed surface of the external maxillipeds and of the chelipeds and ambulatory legs are naked, smooth, and highly polished, though the dorsal surface of the carapax is minutely punctate, the punctations being more numerous on the anterior portions. The subhepatic and the adjacent anterior pleural regions are slightly hairy or pubescent.

Professor Verrill tells me that the color of the entire animal shortly after it was placed in alcohol, and before the color could have changed materially from that in life, was light orange-red.

The single specimen, from which the above description is drawn, gives the following measurements:

	mm.
Length of carapax, including rostrum .....	32.4
Breadth of carapax just back of lateral spines .....	22.0
Breadth of carapax between tips of lateral spines.....	22.5
Breadth of front between tips of lateral spines .....	6.8
Length of rostrum.....	4.0
Length of abdomen .....	25.0



Station 873; 100 fathoms.

Another and very much smaller specimen, from station 876, 120 fathoms, though differing very much from the larger specimen, is probably the young of the same species. The carapax of this specimen is proportionately longer; the orbital sinuses are much larger; the lateral spines of the front are more slender and much longer, longer even than the rostral tooth, and curved slightly outward and upward toward the tips; and the lateral spines are much longer and directed more outward. There is a small tubercle upon the third somite of the abdomen, and in place of the tubercle on the fourth somite there is an acute spine, much longer than the somite itself. There is also a small spiniform tubercle on the lower side of the ischium of the third pair of ambulatory legs.

	mm.
Length of carapax, including rostrum.....	10.3
Breadth of carapax just back of lateral spines .....	5.7
Breadth of carapax between tips of lateral spines .....	6.8
Breadth of front between tips of lateral spines .....	3.6
Length of rostrum.....	1.5

#### **Hemipagurus**, gen. nov.

The genus for which this name is proposed is allied to *Spiropagurus* Stimpson (Proc. Acad. Nat. Sci. Philadelphia, x, 1858, p. 236 (74), 1859), but differs conspicuously in the form and position of the sexual appendage of the last thoracic somite of the male. In *Spiropagurus* this appendage (formed by the permanent extrusion of a portion of the vas deferens) arises from the coxa of the *left* side of the last thoracic somite; while in the genus here proposed it arises from the corresponding coxa of the *right* side, is shorter than in *Spiropagurus*, and curved in one plane round the right side of the abdomen.

The carapax is short and broad, and the anterior margin is obtuse, and does not wholly cover the ophthalmic somite between the eyes. The portion in front of the cervical suture is indurated, but all the rest of the carapax is very soft and membranaceous, without any distinct induration along the cardiaco-branchial suture. The ophthalmic scales are well developed. The eye-stalks are short and the cornea expanded. The antennulæ, antennæ, and oral appendages are similar to those in *Eupagurus*; the exopods of all the maxillipeds are, however, proportionally much longer than in that genus. There are eleven pairs of phyllobranchiæ, arranged as in *Eupagurus bernhardus*, but the two anterior pairs connected with the external maxillipeds are very small and rudimentary, and composed of a few slightly flattened papillæ, so that they are, strictly speaking, trichobranchiæ. The chelipeds are slender and unequal. The first and second pairs of ambulatory legs are long, and have slender, compressed, and ciliated or setigerous dactyli; the third pair are only imperfectly subcheliform.

In the male, the second, third, and fourth somites of the abdomen bear small appendages upon the left side, as in most of the allied genera,



but the fifth somite is destitute of an appendage; in the female, the appendages of the second, third, and fourth somites are biramous and ovigerous, and there is usually a rudimentary uniramous appendage upon the fifth somite, as in the allied genera.\* The uropods are very nearly or quite symmetrical, the rami of the right appendage being very nearly or quite as large as that of the left. The telson is bilobed at the extremity.

As might be expected, the unsymmetrical development of the external sexual appendages of the males of the two species here described corresponds to a like unsymmetrical development of the internal sexual organs, and the following incomplete observations, made on ordinary alcoholic specimens in which the abdominal viscera are not sufficiently well preserved for a full anatomical or histological investigation, appear of sufficient importance to notice here, especially as nothing appears to be known of the internal structure of either species of *Spiropagurus*.

The right testis and vas deferens are much larger than the left. The lower part of the right vas deferens, in all the adults examined, is much more dilated than the left, and is filled (as is also the external part of the duct) with very large spermatophores of peculiar form. The left vas deferens is slender, much as in *Eupagurus bernhardus*, terminates in a small opening in the left coxa of the last thoracic somite, as in ordinary Paguroids, and contains spermatophores somewhat similar in form and size to those of *Eupagurus bernhardus*. In alcoholic specimens of *H. socialis* the spermatophores from the left vas deferens are approximately  $0.16^{\text{mm}}$  long and  $0.035^{\text{mm}}$  broad, with a slender neck about a third of the entire length, and a very thin and delicate lamella for a base. The spermatophores from the right vas deferens are over  $2^{\text{mm}}$  in total length; the body itself is oval, approximately  $0.40^{\text{mm}}$  long and a third as broad; at one end it terminates in a very long and slender process, two or three times as long as the body; at the other end there is a similar but slightly stouter process, a little longer than the body, and expanding at its tip into a broad and very delicate lamella, approximately  $0.35^{\text{mm}}$  long by  $0.20^{\text{mm}}$  broad. The contents of the two kinds of spermatophores are, of course, not in a condition to show the structure of the spermatozoa, but they present a similar appearance in each case, and are apparently of about the same size.

**Hemipagurus socialis**, sp. nov.

*Male*.—The part of the carapax in front of the cervical suture is about a fifth broader than long; the sides nearly parallel; the front margin sinuous, curving slightly forward in the middle and each side between the eye-stalks and the peduncles of the antennæ, the middle lobe thus formed being scarcely more prominent than the lateral lobes, each of

\* In many of the best preserved and most perfect females of *Hemipagurus socialis* examined I can find no trace whatever of this appendage of the fifth somite, while in others it is very easily seen.

which is armed with a minute spine, projecting forward just inside of the peduncle of the antenna; between these spines the edge of the front is upturned in a sharp marginal carina, which terminates each side in the spines themselves. The dorsal surface of this part of the carapax is convex in both directions, the protogastric lobes are protuberant and well marked, and nearly the whole surface is roughened, and more or less tuberculose, with transverse scabrous elevations, which give rise to numerous hairs. The branchial regions are slightly swollen, so that the breadth of the carapax posteriorly is greater than in front. All the portions back of the cervical suture are smooth and membranaceous.

The eye-stalks are about half as long as the carapax in front of the cervical suture, flattened and expanded distally, where they are about three-fourths as broad as long. The eye itself is black, and the cornea extends round either side so as to be crescent-shaped as seen from above. The ophthalmic scales are less than half as long as the eye-stalks, narrow, triangular, and acute.

The first and second segments of the peduncle of the antennula are subequal in length, and the ultimate segment nearly once and a half as long as the penultimate, and almost as long as the eye-stalks. The superior, or major, flagellum is nearly as long as the ultimate segment of the peduncle; the thick, ciliated basal portion consists of about fourteen segments, and the slender terminal portion, which is nearly once and a half as long as the basal, of about five very slender and subequal segments. The minor flagellum is about two-thirds as long as the major, and composed of about eight segments. The peduncle of the antenna reaches by the eye nearly the length of the last segment, which is about as long as the greatest diameter of the eye. The acicle is slender, acute, and slightly longer than the last segment of the peduncle. The flagellum reaches beyond the tips of the ambulatory legs.

The chelipeds are slender and very nearly equal in length, but the right is very much stouter than the left. In the right cheliped the merus and carpus are subequal in length, together nearly twice as long as the carapax, and both are rough and obscurely spinous, the spines being most conspicuous on the edges of the upper surface of the carpus, which is fully three times as long as broad, flattened above, and angular, but not distinctly carinated along either side. The chela is not far from twice as long as the carpus, nearly three times as long as broad, compressed vertically, evenly rounded, smooth and nearly naked above, but clothed with long, soft hair beneath; the digits are longitudinal, not gaping, and the dactylus is about two-thirds as long as the basal portion of the propodus, and its prehensile edge is armed with a broad tooth near the middle. In the left cheliped the merus and carpus are similar to those of the right, but much more slender and a little longer; the carpus is about six times as long as broad, and the edges of the upper surface are rather more sharply angular than in the right; the chela is shorter than the right, but very slender, smooth, and nearly

naked; the digits are similar, longitudinal, slightly longer than the basal portion of the chela, compressed, slightly curved downward toward the tips, but the prehensile edges straight and very minutely serrate.

The ambulatory legs are very nearly equal in length, and slightly overreach the chelipeds; the merus is about as long as the left chela, and roughened with small spines on the upper and under edges; the propodus is shorter than the merus, compressed, smooth, and ciliated along the edges; the dactylus is a little longer in the second than in the first pair, but in both shorter than the propodus, very strongly compressed, very slightly twisted, about ten times as long as broad, and thickly ciliated along both edges, except for a short distance along the lower edge near the tip.

The *female* is smaller than the male, and has proportionally shorter ambulatory legs, and chelipeds very much shorter and much more alike. The right chela is only about a third longer than the carpus, little more than a third as broad as long, and the digits are slender and nearly as long as the basal portion. The left cheliped is proportionally stouter than in the male, and thus approximates to the right; the chela itself is scarcely more than a third longer than the carpus. The ambulatory legs overreach the chelipeds by nearly or quite the full length of the dactyli, but all the segments have very nearly the same relative proportions as in the male.

The eggs are few in number and very large, being about a millimeter in diameter in alcoholic specimens.

In young males the chelipeds and ambulatory legs are similar to those of the female.

*Measurements.*

	♂ (Sta. 877).	♂ (Sta. 878.)	♀ (Sta. 878).
	<i>mm.</i>	<i>mm.</i>	<i>mm.</i>
Length from front of carapax to tip of abdomen.....	19.0	16.5	16.0
Length of carapax along median line.....	7.7	6.3	5.6
Length of carapax from front to cervical suture.....	5.3	4.7	4.0
Breadth of carapax in front.....	6.5	5.3	4.8
Length of eye-stalks.....	2.9	2.6	2.5
Greatest diameter of eye.....	2.1	1.8	1.7
Length of peduncle of antennula.....	6.0	5.5	5.1
Length of ultimate segment of the same.....	2.7	2.4	2.2
Length of peduncle of antenna beyond front.....	4.5	4.0	3.4
Length of ultimate segment of peduncle of antenna.....	2.1	1.9	1.7
Length of right cheliped.....	32.0	24.8	15.5
Length of carpus.....	7.0	5.5	4.0
Length of propodus.....	12.7	10.0	5.4
Breadth of propodus.....	4.5	3.4	1.9
Length of dactylus.....	5.6	4.5	2.8
Length of left cheliped.....	28.0	24.0	15.1
Length of carpus.....	7.6	6.3	4.0
Length of propodus.....	10.0	8.0	5.1
Breadth of propodus.....	2.1	1.7	1.3
Length of dactylus.....	5.7	4.5	2.8
Length of first ambulatory leg, right side.....	34.0	28.0	21.0
Length of propodus.....	8.4	6.8	5.2
Length of dactylus.....	6.8	5.3	5.0
Length of second ambulatory leg, right side.....	34.5	28.2	21.5
Length of propodus.....	8.9	7.2	5.8
Length of dactylus.....	8.0	7.0	6.0

The carcinœcium is very rarely a naked gastropod shell; in most of the specimens seen it is either built up by a colony of *Epizoanthus Americanus*, like the carcinœcium of *Eupagurus Kröyeri*, from the same stations, or is made up in a somewhat similar way by the single polyp of a species of *Adamsia*, the base secreted by the *Adamsia* being expanded on either side and united below so as to inclose the crab in a broadly conical cavity, with only a slight spiral curvature. The nuclei about which these polypean carcinœcia are formed are of various origins; the majority of the *Adamsia* carcinœcia appear to have been built upon fragments of pteropod shells, in some cases upon bits of worm-tubes, in one case upon the entire shell of a *Cadulus*, the greater part of the shell being left protruding from the base of the polyp. In the carcinœcia formed by *Epizoanthus* the nucleus seems usually to have been absorbed, so that nothing is left distinguishable from the colony of polyps itself. In some cases the *Adamsia* has completely overgrown a small *Epizoanthus* carcinœcium, so that when the *Adamsia* is removed a perfect *Epizoanthus* carcinœcium is found beneath as a nucleus. The carcinœcium of this species, and of *H. gracilis* as well, does not cover the animal to the same extent as is usual in the species of *Eupagurus*, the anterior part of the carapax evidently being constantly exposed, its induration fitting the animal for such exposure. The *Epizoanthus* carcinœcia are, however, very often disproportionally large for the crabs inhabiting them, having grown out either side until they are several times broader than long. In spite of these often enormous carcinœcia, both species of the genus probably swim about by means of the ciliated dactyli of the ambulatory legs, as *Spiropagurus spiriger* has been observed to do by Stimpson (Proc. Acad. Nat. Sci. Philadelphia, 1858, p. 248 (86), 1859).

Stations 865, 870, 871, 872, 873, 874, 876, 877, 878, 880; 65 to 252 fathoms. At many of these stations it occurred in very great abundance.

***Hemipagurus gracilis*, sp. nov.**

This is a smaller and more slender species than the last, and is readily distinguished from it by the smooth carapax, the longer and more slender eye-stalks, the long and acicular ophthalmic scales, and by the narrow dactyli of the ambulatory legs being longer than the corresponding propodi.

*Male*.—The carapax in front of the cervical suture is flat, smooth, nearly naked, and scarcely at all areolated. The anterior margin is rather more strongly sinuous than in *H. socialis*, and the lateral lobes are slightly angular and each is tipped with a minute spine, as in that species, but the marginal carina between these spines is much less distinct.

The eye-stalks are more than half as long as the carapax in front of the cervical suture, flattened and expanded distally, but only about half as broad as long. The eyes themselves are as in *H. socialis*. The ophthalmic scales are more than half as long as the eye-stalks, and are acicular and regularly acute.

The ultimate segment of the peduncle of the antennula is as long as



the eye-stalk and nearly twice as long as the penultimate segment. The major flagellum is as long as the ultimate segment of the peduncle, the basal portion of about eight segments, the terminal portion three times as long and of about five subequal and very slender segments. The minor flagellum is about half as long as the major, and composed of about six segments. The antennæ are very much as in *H. socialis*.

The chelipeds are nearly equal in length and similar to those of *H. socialis*, but in the right cheliped the inner edge of the upper surface of the carpus is angular, and armed with a regular series of twelve to eighteen small spines, while the outer edge is rounded and unarmed; and the prehensile edge of the dactylus is armed with two irregular and indistinct teeth, corresponding with two irregular emarginations in the edge of the digital portion of the propodus. In the left cheliped the outer edge of the upper surface of the carpus is slightly rounded and scarcely at all spinulose, while the inner edge is armed as in the right cheliped. The left chela differs from that of *H. socialis* in having the digital portion of the propodus considerably stouter than the dactylus, particularly toward the base.

The ambulatory legs are proportionally as long but more slender than in *H. socialis*; in both pairs the dactylus is longer than the propodus, curved slightly near the tip, about sixteen times as long as broad, sparsely ciliated along the upper edge, and very slightly setigerous along the lower.

The female differs from the male as in *H. socialis*, but to a very much less extent, the chelipeds and ambulatory legs being only a little shorter than in the male, and the right cheliped only a little less stout and a little more like the left than in the male.

The eggs are few and nearly as large as in *H. socialis*.

*Measurements.*

	♂ (Sta. 874).	♀ (Sta. 874).
	<i>mm.</i>	<i>mm.</i>
Length from front of carapax to tip of abdomen.....	12.0	11.2
Length of carapax along median line.....	3.4	3.2
Length of carapax from front to cervical suture.....	2.2	2.1
Breadth of carapax in front.....	2.8	2.4
Length of eye-stalks.....	1.6	1.5
Greatest diameter of eye.....	1.1	0.9
Length of peduncle of antennula.....	3.4	3.2
Length of ultimate segment of the same.....	1.6	1.5
Length of peduncle of antenna beyond front.....	2.3	1.9
Length of ultimate segment of peduncle of antenna.....	1.0	0.8
Length of right cheliped.....	15.2	11.2
Length of carpus.....	4.0	2.8
Length of propodus.....	6.0	4.4
Breadth of propodus.....	2.4	1.8
Length of dactylus.....	2.0	1.7
Length of left cheliped.....	13.6	10.0
Length of carpus.....	3.8	2.6
Length of propodus.....	5.0	3.6
Breadth of propodus.....	1.1	1.0
Length of dactylus.....	2.5	1.9
Length of first ambulatory leg, right side.....	16.1	12.8
Length of propodus.....	4.0	3.2
Length of dactylus.....	5.0	4.0
Length of second ambulatory leg, right side.....	17.0	14.0
Length of propodus.....	4.6	3.7
Length of dactylus.....	5.4	4.5



The carcinœcium in all the specimens examined is a colony of *Epizoanthus*, but this species, like *H. socialis*, probably sometimes inhabits an *Adamsia* carcinœcium.

Stations 865, 870, 871, 874, 877, 878; 65 to 155 fathoms; associated with *H. socialis*, but not at all abundant.

*Parapagurus pilosimanus* Smith, Trans. Conn. Acad., v, p. 51, 1879.

Stations 880, 893, 894; 252 to 372 fathoms.

Since this species was described, from a single specimen taken in 250 fathoms off Nova Scotia, a few additional specimens have been brought in by fishermen from deep water off Nova Scotia. In all the specimens seen, the carcinœcium is built up by a compound actinoid polyp, as in the specimen first described. Some of the young specimens show very plainly the gastropod shell, which serves as a nucleus about which the polypean carcinœcium is built.

*Eupagurus bernhardus* Brandt ex Linné.

Station 835; 65 fathoms; two small specimens.

*Eupagurus Kröyeri* Stimpson.

Stations 869, 870, 877, 878; 126 to 192 fathoms; many specimens, mostly small, and all in carcinœcia formed by colonies of *Epizoanthus Americanus*.

*Eupagurus*, sp.

Stations 865 to 867, 869 to 874, 876 to 880, 893 to 895; 65 to 365 fathoms.

A species of about the size of *E. Kröyeri*, and quite distinct from the species heretofore known upon our coast, and apparently distinct from all the described European species.

? *Munida Caribæa* Stimpson, Ann. Lyceum Nat. Hist. New York, vii, p. 244 (116), 1860.

Stations 835, 871 to 874, 877, 878; 65 to 142 fathoms. Very abundant at 871; 115 fathoms.

It is with considerable hesitation that I refer these specimens to Stimpson's species, which was very briefly described, apparently from a single very small specimen, and with no more precise indication of its habitat than is implied in the specific name. Very small specimens of the species before me agree very well, however, with Stimpson's description, except that he says, "eye-peduncles longer and the cornea less dilated than usual", while in the species before me the eye-stalks are just about as long as in *M. Bamffia* and the cornea fully as much expanded horizontally, though considerably more compressed vertically; but this vertical compression is perhaps what Stimpson referred to in speaking of the cornea as "less dilated than usual".

The species in hand resemble *M. tenuimana* G. O. Sars in the length and slenderness of the chelipeds, which are even longer and more slender than in that species, from which, however, it is sufficiently distinct.

The armature of the carapax, chelipeds, and ambulatory legs is more like *M. Bamffia* than *tenuimana*. There are usually six subequal and nearly equidistant spines upon the anterior half of the lateral margin of the carapax, of which one is in front of the cervical suture, three upon the hepatic region, and two upon the anterior part of the branchial region. There are no spines upon the posterior border of the carapax and none upon the abdomen, except two very small ones on the anterior edge of the second somite. The chelipeds are very long and slender, in large specimens being a half or more longer than the entire body, nearly cylindrical, and the merus and carpus sparsely armed with small spines; but the chela, which is longer, but no stouter, than the merus, is without spines.

Four specimens give the following measurements:

	♂	♀	♂	♂
	mm.	mm.	mm.	mm.
Length.....	48.5	48.0	23.0	17.5
Length of carapax, including rostrum.....	25.0	24.2	12.3	9.2
Length of rostrum.....	9.1	8.9	4.9	3.4
Breadth of carapax in front of cervical suture.....	11.1	11.7	5.7	4.4
Greatest breadth, excluding spines.....	13.7	11.0	6.2	4.8
Breadth near posterior margin.....	12.3	13.0	6.0	4.5
Length of cheliped.....	84.0	79.0	36.5	22.8
Length of merus.....	34.3	32.0	14.8	8.3
Length of carpus.....	6.0	5.0	3.0	2.0
Length of chela.....	39.0	36.0	15.9	9.8
Length of dactylus.....	17.0	17.4	7.2	4.3
Length of first ambulatory leg.....	50.0	47.7	22.0	14.0
Greatest diameter of eye.....	4.0	4.0	3.6	2.0

## MACRURA.

### *Arctus depressus*, sp. nov.

This species is represented only by a single, small, and probably immature individual, but is apparently distinct from any known species of the genus, and is readily distinguished by the very broad and greatly depressed cephalo-thorax, which in these respects is like *Ibaeus*, and by the conspicuous spines each side of the posterior segments of the sternum. The depressed form is perhaps partially a character of immaturity, being an approach to the *Phyllosoma*-stages, and it is possible that the sternal spines disappear in the adult.

The carapax is less than half as thick as broad, and the breadth is much greater than the length along the middle line above, but slightly less than the length of the lateral margin, which is convex in outline, so that the greatest breadth is near the middle of the length. The antero-lateral angles are acute and very prominent, extending far forward of the rest of the front and to a line slightly in advance of the first dorsally exposed segment (the true second peduncular) of the antenna each side. The orbits are very large, almost completely open in front, and occupy fully a third of the width of the whole front. The median carina is low, being, even in the middle of its length, only a little higher than the lateral carinae, and rises into two low, dentiform prominences, one

at about the middle of the carapax and another a little back of the anterior margin, and in front of the latter the carina is almost wholly obsolete. The lateral carinæ are prominent along the inner sides of the orbits, terminating in front in the elevated and irregularly dentate inner angles of the orbits. Just back of the orbit there is a hiatus in the carina, from which the carina extends uninterruptedly to near the posterior margin, though its crest is minutely and obscurely dentate. The surface of the longitudinal depressed spaces between the median and lateral carinæ are naked and nearly smooth, and so is the narrow and slightly concave space between each lateral carina and the edge of the carapax, except for a line of small tubercles just outside the carina and a few additional ones outside of these, near the postero-lateral angle. The lateral margin is thin and the edge sharp, and divided by a sharp incision at the cervical suture, by an incision slightly less deep a little way back of the cervical suture, and by two or three obscure notches along the branchial region, while the edge between these incisions and notches is irregularly and very minutely dentate.

The eyes are large, with an expanded cornea, and black. The two lobes of the antennular somite rise in front into small dentiform tubercles, and so do the first and second of the dorsally exposed segments of the antennæ. The second exposed segment of the antenna is about as broad as long, carinated above, acutely angular in front, and the inner and outer edges are each armed with three teeth, of which the anterior in each case is obscure. The terminal segment is short, and the slightly arcuate anterior margin is deeply five-lobed.

The sternum is triangular and very broad, the breadth between the bases of the posterior legs being nearly as great as the length along the median line. The edges are slightly raised above the bases of the legs, and terminate posteriorly, back of and below the base of the fifth leg, in a conspicuous spine, directed backward.

The abdomen, to the tip of the telson, is twice as long as the carapax along the median line above, is at base much narrower than the carapax, and tapers regularly and so rapidly that at the sixth somite it is little more than two-thirds as broad as at base. There is a slight median carina on the second to the fifth somite, and the dorsal surface is naked and sparsely punctate, but otherwise nearly smooth. The pleura of the second, third, fourth, and fifth somites are nearly perpendicular and slightly carinated in the middle; the second is broader than the others and nearly right-angled, but terminates in a spiniform tip, turned backward; the third is angular, but not spiniform at the extremity; and the fourth and fifth are obtuse or rounded. The sixth somite is about as long as, but considerably narrower than, the fifth, and its pleura are small and narrowly triangular. The telson is much longer than broad, tapers very slightly distally; the posterior portion is very thin, delicate, and transparent, and the posterior edge is slightly curved and the angles rounded. The lamellæ of the uropods are as long as and much broader

than the telson, and, except a small portion near the base, are thin and transparent like the terminal part of the telson.

*Measurements.*

	mm.
Length from front of carapax to tip of telson .....	18.7
Length from tips of antennæ to tip of telson .....	23.2
Length of carapax along median line above .....	6.2
Length of carapax along lateral margin .....	9.0
Greatest breadth of carapax .....	8.3
Breadth between anterior angles .....	7.5
Breadth posteriorly .....	6.2
Greatest thickness of cephalo-thorax .....	3.5
Breadth of first somite of abdomen .....	6.1
Breadth of sixth somite of abdomen .....	4.0

Station 872; 86 fathoms.

In the outline of the edges of the segments of the antennæ and in the divisions of the carinæ of the carapax this species is much like *A. Americanus* Smith (Amer. Journ. Sci., II, xlvii, p. 119, 1869; *Scyllarus (Arctus) Gundlachi* von Martins, Archiv für Naturgesch., xxxviii, p. 123, pl. 5, fig. 13, 1872), the young of which it may possibly prove to be, though this seems very improbable considering that the specimen just described is half as long as ordinary specimens of *A. Americanus*, which is known from the Gulf of Mexico and the West Indies.

*Nephropsis aculeatus*, sp. nov.

Very closely allied to *Nephropsis Stewarti* Wood-Mason (Journ. Asiatic Society of Bengal, xlii, part ii, p. 39, pl. 4, 1873), described from a single female, 98<sup>mm</sup> long and wanting the chelipeds, dredged in 260 to 300 fathoms in the Bay of Bengal.

*Male*.—In specimens 30<sup>mm</sup> to 34<sup>mm</sup> in length the rostrum is very slightly longer proportionately than represented in the figures of *N. Stewarti*, but in all other respects the carapax shows no differences whatever. The abdomen is as represented in the figure of *N. Stewarti*, except that the pleura of the second to the fifth somite, inclusive, project farther downward and terminate in slender, acuminate, and spiniform tips, and that the pleuron of the sixth somite is sharply right-angled below, and not rounded. The uropods and telson show no differences whatever.

The chelipeds are equal, or very nearly so, about a fourth longer than the carapax, including the rostrum, and are carried with the chelæ held horizontally, as in *Nephrops* and *Homarus*. The merus is about as long as the rostrum, and is armed near its distal end with a slender spine above and a similar one below. The carpus is short, a little longer than broad, slightly broader than the distal part of the merus, and is armed with three small spines—one near the middle of the inner edge, one at its distal end, and another beneath at the articulation with the chela. The chela is scarcely longer than the merus and slightly broader than the carpus, somewhat compressed vertically, rounded above and below, and



without spines, except a few very minute dentiform ones along the inner edge of the propodus; the propodal digit is longitudinal and tapers to a slender incurved tip; the dactylus is a little longer and stouter than the propodal digit, and has a longer and more strongly curved tip, which closes beneath the tip of the propodus; the prehensile edges of both digits are sharp and minutely crenulate. The upper surface and the inner edge of the carpus and the upper surface and both edges of the chela are thickly clothed with very long and soft pubescence, directed distally. The succeeding pairs of legs are very nearly as in *N. Stewarti*. The second pair are about three-fourths as long as the chelipeds, slender and perfectly chelate. The third pair are a little longer than the second and not quite as perfectly chelate. The fourth are a little longer than, and the fifth about as long as, the chelipeds.

Very imperfect *female* specimens, considerably larger than the males above described, have the chelipeds a little larger and stouter proportionally than in the males, and the pleura of the second to the fifth somite of the abdomen very slightly less prolonged, but still acuminate and spiniform, and very different from *N. Stewarti*.

One of the males and an imperfect female give the following:

*Measurements.*

	♂	♀
	mm.	mm.
Length from tip of rostrum to tip of telson.....	34.0	.....
Length of carapax, including rostrum.....	16.4	.....
Length of rostrum.....	7.0	.....
Length of rostrum in front of spines.....	4.6	.....
Breadth of carapax.....	5.5	.....
Height of carapax.....	6.0	.....
Length of chelipeds.....	20.0	32.0
Length of merus.....	7.0	11.0
Length of carpus.....	3.5	5.0
Length of chela.....	7.1	12.5
Breadth of chela.....	2.3	4.9
Length of dactylus.....	4.0	6.2
Length of second pair of legs.....	15.5	24.0
Length of merus.....	5.7	9.0
Length of carpus.....	2.6	4.0
Length of chela.....	3.8	6.7
Breadth of chela.....	0.8	1.3
Length of dactylus.....	1.4	2.2
Length of third pair of legs.....	17.5	27.0
Length of carpus.....	3.1	4.8
Length of propodus.....	5.3	8.0
Breadth of propodus.....	0.5	0.8
Length of propodal digit.....	1.1	1.8
Length of dactylus.....	1.9	2.1
Length of fourth pair of legs.....	22.0	33.0
Length of propodus.....	5.2	7.9
Length of dactylus.....	2.8	4.8
Length of fifth pair of legs.....	20.5	31.0
Length of propodus.....	5.0	7.3
Length of dactylus.....	3.0	4.5
Length of telson.....	3.9	.....
Breadth of telson.....	2.6	.....

Station 873; 109 fathoms (3 males). Station 876; 120 fathoms (one very imperfect female from the stomach of *Lopholatilus*). Station 877; 126 fathoms (fragments of two or three specimens).

As Wood-Mason has remarked, the genus *Nephropsis* is closely allied



to *Nephrops*. The structure and arrangement of the branchiæ were apparently not examined by Wood-Mason, but in our species they agree with *Nephrops Norvegicus*, there being nineteen branchiæ upon each side, arranged like the nineteen posterior branchiæ of each side of *Homarus*. The branchia of the second maxilliped is wholly wanting, unless it is represented by a minute, papilla-like process near the base of the epignath. The oral appendages agree perfectly with those of *Nephrops Norvegicus*. The densely pubescent chelipeds, however, are very different from the naked and carinated chelipeds of *Nephrops*, and probably afford an additional generic distinction.

***Axius armatus*, sp. nov.**

*Female*.—The carapax is strongly compressed, about twice as long as high, smooth and nearly naked. The rostrum is narrow, acuminate, spiniform at the tip, and armed along each edge with four or five slender, acute, and spiniform teeth, directed forward and slightly upward. From the edge of the rostrum a sharp lateral carina runs back on each side more than a third of the way to the cervical suture. The dorsal carina is sharp anteriorly, extends back nearly to the cervical suture, but anteriorly only as far as the posterior marginal teeth of the rostrum, and is armed with two spiniform teeth just back of the base of the rostrum. About half way between the dorsal and lateral carinæ there is a very distinct subdorsal carina, parallel with and extending back nearly as far as the dorsal, and in front turned abruptly inward opposite the posterior dorsal tooth, but not quite reaching the dorsal carina.

The eyes are small and black.

The peduncle of the antennula reaches by the tip of the rostrum the full length of the last segment, and the flagella are subequal in length and about as long as the carapax. The third segment of the peduncle of the antenna is armed with a slender spine on the lower side of the distal end. The distal spine on the second segment, at the base of the acicle, is slender, acute, and more than half as long as the rest of the segment, while the acicle is slender, straight, and as long as the fourth segment, which is slender, and about as long as the second segment together with its distal spine. The fifth, or last, segment is not more than a third as long as the fourth. The flagellum is more than twice as long as the carapax.

The merus of the external maxilliped is armed at the distal extremity of the lower edge with two very long and slender spines.

The larger cheliped is about twice as long as the carapax, and the chela itself, to the tip of the dactylus, is nearly as long as the carapax. The propodus is strongly compressed, about half as broad as the entire length and three-fourths as broad as the length of the basal portion, which is convex on both sides and has the edges sharp and carinated. The digital portion is longitudinal, about three-fourths the entire length, more than half as long as the basal portion, slightly upturned at the tip,

and armed with a stout tooth near the middle of the prehensile edge. The dactylus is as long as the basal portion of the propodus, about three-fourths longer than the propodal digit, strongly curved toward the tip, and the prehensile edge is sharp and minutely crenulate, but not toothed, and closes by the inner side of the tip of the propodus. The smaller cheliped is similar in form to the larger, but is considerably shorter and very much more slender, and the propodal digit is proportionately longer and its prehensile edge thin and minutely multidentate. Both chelæ are sparsely hairy on the digits and very slightly along the margins of the basal portions. The second pair of legs are very slender and a little longer than the carapax; the merus is about as long as the carpus and chela taken together; the carpus is less than half as long as and slightly narrower than the merus and about three times as long as broad; the chela is slightly longer but scarcely broader than the carpus, and the digits are slender, longitudinal, not gaping, and a little shorter than the basal portion. The third and fourth pairs of legs are very nearly alike, and as long as the second, but more slender; the merus is about as long as the carpus and propodus together; the propodus is about a third longer than the carpus; and the dactylus is slender, nearly straight, and about two-fifths as long as the propodus. The fifth, or posterior, legs are considerably shorter and much more slender than the third and fourth pairs, being nearly cylindrical; the merus is about as long as the propodus; the carpus about three-fifths as long; the dactylus is about half as long as the carpus.

The abdomen is much narrower than the carapax and not expanded in the middle, the sides being nearly straight and parallel. The lamellæ of the uropods are about as long as the telson, the outer as long as broad, the inner a little narrower. The telson is about a third longer than the sixth somite of the abdomen, about two-thirds as broad as long; the lateral edges are nearly parallel and each armed with about four small spines; the posterior margin is regularly arcuate. Near the middle of the dorsal surface there is a transverse line of four small spines, and there are one or two more between these and the tip.

An imperfect *male* specimen, wanting the chelipeds and most of the abdomen, has three spines in front on the dorsal carina, and the spines, of the rostrum slightly longer than in the female.

The single female gives the following:

	mm.
Length from tip of rostrum to tip of telson .....	44.0
Length of carapax to tip of rostrum.....	16.3
Length of rostrum.....	3.1
Height of carapax.....	8.2
Breadth of carapax.....	7.0
Length of right cheliped .....	31.0
Length of left cheliped .....	25.0
Length of right merus.....	8.3
Length of left merus .....	7.0
Length of right propodus.....	12.5

	mm.
Length of left propodus .....	9.0
Breadth of right propodus .....	6.0
Breadth of left propodus .....	3.1
Length of right propodal digit .....	4.5
Length of left propodal digit .....	4.0
Length of right dactylus .....	8.0
Length of left dactylus .....	5.2
Length of telson .....	5.5
Breadth of telson .....	3.8

Stations 873 and 878; 100 and 142 fathoms.

This species is at once distinguished from *A. stirynchus* and *A. serratus* by the narrower and acuminate rostrum, the teeth on the dorsal carina, the form of the chelipeds, and the more slender second, third, and fourth pairs of legs. In *A. stirynchus* and *serratus* the carpus in the second pair of legs is short, expanded distally, and less than half as broad as long, and the chela is nearly or quite half as broad as long.

*Axiu serratus* Stimpson (Proc. Boston Soc. Nat. Hist., iv, p. 222, 1852; Smith, Trans. Conn. Acad., v, p. 55, pl. 10, fig. 4, 1879) was dredged the past season from the "Fish Hawk", in 20 fathoms, sandy bottom, in Narragansett Bay; and large specimens, taken on George's Banks, have been presented to the National Museum by Capt. John Q. Getchell and crew of the schooner "Otis P. Lord", of Gloucester, Mass.

These specimens show that Stimpson's species is distinct from the European *stirynchus*. The *serratus* is at once distinguished by its broad and depressed abdomen, which expands laterally in the middle, and is much broader than the carapax. The fourth segment of the peduncle of the antenna and the aciele are both proportionally much longer in *serratus* than in *stirynchus*, being nearly as long as in the species just described. The upper edge of the propodus in both chelipeds is thin and strongly carinated in *serratus*, but thick and rounded in *stirynchus*, and the smaller cheliped is much narrower and has much longer and more slender digits in *serratus* than in *stirynchus*.

#### **Pontophilus Norvegicus** M. Sars.

Stations 869, 870, 880, 881, 893, 894, 895; 155 to 372 fathoms.

The largest females are 74<sup>mm</sup> long, the largest male 47<sup>mm</sup>. Several of the specimens belong to the variety with the broad and obtuse rostrum described by Sars.

#### **Pontophilus brevirostris**, sp. nov.

Very closely allied to *P. spinosus* and *P. Norvegicus*, but readily distinguished from both these species by the very short rostrum, which is tridentate, with the median tooth scarcely broader and very little longer than the lateral, about reaching to the cornea of the inner side of the eye and not projecting beyond the line of the spiniform outer angles of the orbits. The proportions of the body are more like *spinosus* than *Norvegicus*, but the carination and armature of the carapax are more

like *Norvegicus*, while the sculpture of the distal somites of the abdomen is more like *spinosus*.

The dorsal carina of the carapax is armed with three spines, and usually a smaller fourth one in front of the others and just back of the base of the rostrum; the subdorsal carina is armed with two spines, as in *Norvegicus*, and often with a rudiment of a third behind these; the lateral carina does not extend back of the middle of the carapax, and is armed with a single spine, as in *Norvegicus*. There are no distinct carinae on the first four somites of the abdomen, but the fifth somite is flattened above and has subdorsal carinae slightly diverging posteriorly, and below these, each side, another carina, nearly parallel with the subdorsal; and the sixth somite is flattened above and subdorsally carinated, as in *spinosus*, though the carinae are not quite as conspicuous on either somite as in that species.

The eyes, antennulae, and antennae are very nearly as in *P. spinosus*. The external maxillipeds reach a little beyond the tips of the chelipeds, the penultimate segment reaches nearly to the tip of the antennal scale, and the ultimate segment is a little less than twice as long as the penultimate, while in *P. Norvegicus* it is about once and a half as long, and in *P. spinosus* much more than twice as long, as the the penultimate segment. The thoracic legs differ scarcely at all from those of *P. spinosus*.

The lamellae of the uropods are very nearly as in *P. spinosus*. The inner lamella reaches nearly or quite to the tip of the telson, is lanceolate, and six or seven times as long as broad; the outer lamella is about a tenth shorter than the inner and about four times as long as broad. The telson is once and a fourth to once and two-fifths as long as the sixth somite of the abdomen, is very narrow, slightly acuminate, and has a very narrow and acutely triangular tip, armed with only two very long, slender, and plumose setae, which arise near together from the under side.

This species appears to be much smaller than either *Norvegicus* or *spinosus*. The following measurements are from two of the larger specimens:

	♂.	♀.
	mm.	mm.
Length from tip of rostrum to end of telson .....	24.5	36.0
Length of carapax along dorsum .....	6.0	9.5
Length of rostrum in front of the back of the orbit .....	0.7	0.8
Breadth of carapax at anterior margin .....	3.7	5.9
Greatest breadth of carapax .....	3.8	7.1
Length of sixth somite of abdomen .....	3.9	5.3
Breadth of the same in the middle .....	1.1	1.9
Length of telson .....	5.0	7.5
Length of antennal scale .....	3.0	4.4

Stations 865 to 867, 870 to 874, 877, 878; 65 to 155 fathoms. At most of these stations it was taken in great abundance.



**Hippolyte securifrons** Norman.

Stations 897 and 880; 225 and 252 fathoms; three large females.

The branchial formula of this species, written essentially after Huxley's method, is:

Somites.	Podo- branchiæ.	Arthro- branchiæ.	Pleuro- branchiæ.	
VII.....	0 (ep.)	0	0	=0 (ep.)
VIII.....	1 (+ ep.)	0	0	=1 (+ ep.)
IX.....	0 (ep.)	0	0	=0 (ep.)
X.....	0 (ep.)	0	1	=1 (+ ep.)
XI.....	0 (ep.)	0	1	=1 (+ ep.)
XII.....	0 (ep.)	0	1	=1 (+ ep.)
XIII.....	0	0	1	=1
XVI.....	0	0	1	=1
	1 + 6 ep.	0	5	6 + 6 ep.

**Bythocaris** sp.

Stations 865 to 867, 872, 874, 878; 64 to 142 fathoms.

**Pandalus propinquus** G. O. Sars, Christiania Videnskabs-Selskabs Forhandling, 1869, p. 148 (4); *ibid.*, 1871, p. 259 (16).

Stations 878, 879, 880, 893, 894, 875; 142 to 365 fathoms. The largest specimen is a female, over 110<sup>mm</sup> in length.

This species was dredged in 1879 in the Gulf of Maine, off Cape Cod, station 305, N. lat. 42° 9' 30'', W. long. 69° 41', 118 fathoms, soft mud; and station 343, N. lat. 42° 17', W. long. 69° 51', 116 fathoms, mud. A male, 74<sup>mm</sup> long, from station 305, has the chelate second pair of legs reversed, the short one being on the left and the long one on the right! The legs themselves are of the normal size and structure, and the specimen appears to be perfectly normal in all other respects.

As far as I am aware, the species has heretofore been recorded only from deep water off the coast of Norway.

**Pandalus leptocerus**, sp. nov.

In size and general appearance much like *P. Montagu* (*annulicornis*), but more slender and readily distinguished from it, and from *P. propinquus* and *borealis* as well, by the minutely roughened surface and the presence of exopods upon the external maxillipeds.

The rostrum is from about once and a third to nearly twice as long as the rest of the carapax, and curved very slightly upward, but usually not as much so as in *P. Montagu*. Above, it is armed with eleven to thirteen teeth, of which one is near the tip, as in *P. Montagu*, and usually only two back of the orbit on the carapax proper, while a considerable space back of the terminal spine is unarmed, though this space is usually shorter than in *P. Montagu*. Beneath, there are 6 to 8 teeth, as in *P. Montagu*. The entire surface of the carapax and abdomen is slightly roughened with short and irregular, transverse, punctate ridges, which give rise to very short, bristle-like hairs, while in *P. Montagu*, *propinquus* and *borealis* the surface is naked and very smooth. The



carapax is considerably more slender than in *P. Montagu*, and the posterior tooth of the dorsal carina is farther forward, being much in front of the middle. The abdomen is more slender than in *P. Montagu*; but, except for the greater slenderness, there is scarcely any difference in the form or proportions of the somites, or the form and armature of the telson and uropods. There are slender exopods, about a third as long as the ischia, at the bases of the external maxillipeds, but the endopods themselves are as in *P. Montagu*; the merus reaches to the base of the flagellum of the antenna, and the tip falls considerably short of the tip of the antennal scale.

The first pair of legs are nearly as in *P. Montagu*. The right chelate leg of the second pair is shorter and stouter than in *P. Montagu*, and scarcely reaches the tip of the corresponding leg of the first pair; the ischium is about a fourth the entire length; the merus is only a little shorter than the ischium; the carpus increases in thickness distally, is a little longer than the ischium, not more than about once and a half as long as the merus, and usually composed of only five segments, the proximal half being wholly unsegmented or annulated, then three subequal and very distinct segments, about as broad as long, and these followed by the terminal segment, which is about as long as the three next preceding; the chela is about half as long as the carpus and a little stouter than its distal end.\* The left chelate leg is a little shorter and stouter than in *P. Montagu*, but has about the same number of segments in the merus and carpus, and does not differ in other respects. The third, fourth, and fifth pairs of legs differ from those of *P. Montagu* in being a little more slender and in having much longer, much more slender, and nearly cylindrical dactyli, which are wholly unarmed, except a few small spinules beneath near the base.

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\*The proportions of the segments and the segmentation of the carpus in the unequal second pair of legs in the genus *Pandalus* appear to be usually very constant and to afford very good specific characters, but they occasionally present very remarkable variations. In carefully examining several hundred specimens of this species, only about half a dozen were found which varied from the above description in the segmentation of the left carpus; two or three specimens had an additional but less distinctly indicated segment back of the four distal ones, making six in all. Two specimens had three additional segments inserted in the same way, making eight in all; but in both these specimens the segmentation was more or less irregular, and the additional segments may have resulted from some injury. One large female, quite normal in other respects, has the right carpus multiarticulate throughout and composed of about eighteen segments, nearly as in *P. Montagu*; the whole leg, however, is shorter than in other specimens of the same size, and may have been reproduced, though I cannot see how this would explain its abnormal structure. Detailed measurements of both chelate legs in most of these abnormal specimens are given beyond in the tables of measurements.

One female, 70<sup>mm</sup> long, stations 290 to 291, 30 to 31 fathoms, off Cape Cod, has the chelate legs reversed, just as in the specimen of *P. propinquus* already referred to.

*Measurements.*

Number.	Station.	Sex.	Length. <i>mm.</i>	Carpax and rostrum. <i>mm.</i>	Length of rostrum. <i>mm.</i>	Breadth of carpax. <i>mm.</i>	Rostrum, formula.
1	373, off Cape Cod, 42 fathoms.....	♂	52	22.0	12.7	5.5	$\frac{3+8+1}{6}$
2	878, off Block Island .....	♂	60	25.4	15.8	6.0	$\frac{2+8+1}{7}$
3	372, off Cape Cod, 70 fathoms.....	♂	75	36.0	23.1	7.3	$\frac{2+9+1}{7}$
4	878, off Block Island .....	♀	61	27.8	17.0	6.5	$\frac{2+8+1}{6}$
5	878, off Block Island .....	♀	65	29.0	17.5	6.2	$\frac{2+10+1}{7}$
6	372, off Cape Cod, 70 fathoms .....	♀	80	35.0	21.3	8.1	$\frac{2+9+1}{7}$
7	878, off Block Island .....	♀	82	38.3	24.8	8.0	$\frac{2+10+1}{8}$
8	878, off Block Island .....	♀	84	39.5	24.5	8.9	$\frac{2+9+1}{6}$
9	372, off Cape Cod, 70 fathoms.....	♀	90	41.1	26.2	8.9	$\frac{2+9+1}{7}$
10	33, off Cape Ann, 90 fathoms .....	♀	90	42.0	26.5	9.5	$\frac{2+10+1}{7}$
11	33, off Cape Ann, 90 fathoms .....	♀	91	42.3	27.2	9.5	$\frac{2+10+1}{7}$
12	33, off Cape Ann, 90 fathoms.....	♀	98	43.5	27.4	10.2	$\frac{2+9+1}{6}$

Detailed measurements of each of the chelate legs, and the number of segments in the carpus, of nine of the above specimens are given below. The first three columns give the number, sex, and length of each specimen, as in the table above; columns four to nine give the entire length of the leg and the lengths of each of the five distal segments; and the last column gives the number of segments in the carpus. For the left carpus this last number is not perfectly definite, as the segmentation becomes irregular and indistinct toward the proximal end.

No.	Sex.	Length.	Right chelate leg.						
			Length.	Ischium.	Merus.	Carpus.	Propodus.	Dactylus.	No. segs. in carp.
		<i>mm.</i>	<i>mm.</i>	<i>mm.</i>	<i>mm.</i>	<i>mm.</i>	<i>mm.</i>	<i>mm.</i>	
1	♂	52	13	3.4	2.7	4.1	2.1	0.9	5
2	♂	60	15	4.0	3.2	4.5	2.6	1.1	5
3	♂	75	22	5.2	4.9	7.0	3.8	1.5	5
6	♀	80	23	5.9	5.1	7.2	4.0	1.6	5
10	♀	90	24	6.6	5.3	7.6	3.9	1.6	5
7	♀	82	20	5.5	4.4	6.5	3.2	1.2	18
4	♂	61	15	4.1	3.2	4.6	2.5	1.0	6
5	♂	65	16	4.0	3.2	5.0	2.5	1.0	8
8	♀	84	22	5.5	1.6	7.0	3.4	1.3	8

No.	Sex.	Length.	Left chelate leg.						
			Length.	Ischium.	Merus.	Carpus.	Propodus.	Dactylus.	No. segs. in carp.
		<i>mm.</i>	<i>mm.</i>	<i>mm.</i>	<i>mm.</i>	<i>mm.</i>	<i>mm.</i>	<i>mm.</i>	
1	♂	52	24	5.5	4.5	10.1	1.1	0.6	53
2	♂	60	27	6.5	5.9	12.3	1.2	0.6	53
3	♂	75	35	9.0	8.0	15.0	1.9	0.9	58
6	♀	80	37	9.0	8.5	16.0	2.0	1.0	64
10	♀	90	41	10.3	8.8	18.2	2.0	1.0	64
7	♀	82	39	10.0	8.4	17.6	1.9	0.9	63
4	♂	61	27	6.7	5.7	12.2	1.1	0.6	54
3	♂	65	27	6.6	5.8	12.1	1.2	0.6	52
8	♀	84	39	9.0	8.8	17.5	1.9	0.8	56

Station 870, 155 fathoms (abundant); 873, 100 fathoms; 878, 142 fathoms (very abundant). It was also taken in abundance this season at many stations in shallow water off Rhode Island.

In the dredgings off Cape Cod, in 1879, this species occurred at a great number of the stations, in 15 to 116 fathoms, and was very often associated with *P. Montagu*, and at 116 fathoms with *P. propinquus*. It was particularly abundant in 25 to 50 fathoms, several quarts of specimens often being taken at one haul of the trawl. In the dredgings previous to 1879 it occurred very much less abundantly, and was carelessly confounded with *P. Montagu*, under which name specimens of *P. leptocerus* may have occasionally been distributed in the sets of specimens made up from the Fish Commission collections and distributed from the National Museum. In the dredgings of 1877-78, it occurred sparingly, in 22 to 48 fathoms, in Massachusetts Bay; and in 75 to 90 fathoms, in the Gulf of Maine, off Cape Ann, in considerable abundance and of large size; in both localities associated with *P. Montagu*, and in the Gulf of Maine with *P. borealis* also. In Casco Bay, in 1873, a few specimens only were taken. Among great numbers of specimens of *P. Montagu* from the Bay of Fundy I have not succeeded in finding a single specimen of the new species, although it very likely occurs there. At Halifax, Nova Scotia, a few specimens only, most of them very small, were taken, and these were from 18 fathoms. In the region of George's Banks, in 1872, it was taken in 30, 45, 50, 60, and 430 fathoms,

and appears to have been more common than *P. Montagu*, which occurred with the *leptocerus* in 30 and 45 fathoms, and alone in 28 fathoms.\*

*Pandalus tenuipes*, sp. nov.

This species is smaller but has a proportionally thicker body than *P. Montagu*, and the surface of the carapax and abdomen are very minutely roughened, somewhat as in the last species, but the punctate ridges are much less conspicuous and much more thickly crowded than in that species.

The carapax, including the rostrum, is about two-fifths of the entire length, and the carapax proper is nearly as long as the rostrum, slightly swollen in the middle, somewhat contracted in front, as seen from above, and with the rostral carina extending back to about the middle, and armed, at about a third of the way from the front, with two to four slender teeth, crowded close together and rapidly decreasing in size posteriorly; but between these teeth and the posterior tooth of the rostrum the carina is wholly unarmed. The rostrum is curved upward a little more than in *P. Montagu*, is not expanded below, and is armed the whole length above with eight to ten teeth, which are usually more widely separated distally, though in some specimens the terminal two or three are crowded together near the tip; beneath there are six to ten small teeth.

The eyes are black and as broad as long, but shorter than in *P. Montagu*. The peduncle of the antennula reaches to near the middle of the antennal scale, and the two distal segments are subequal in length and each about as broad as long. The antennular flagella are subequal in length and much longer than the carapax, including the rostrum; the proximal half of the outer flagellum is very much thickened, the terminal portion very slender, as is the inner flagellum throughout. The antennal scale is approximately four-fifths as long as the rostrum, and of very nearly the same form as in *P. Montagu*. The external maxillipeds are very slender, reach to about the tip of the rostrum, and have well-developed exopods, fully half as long as the ischium; the ischium is a little longer than the rest of the endopod, which is composed, as in *P. Montagu*, of only two distinct segments beyond the ischium, and in this case these two segments are subequal in length.

The first pair of legs are very slender and reach to the tips of the external maxillipeds. The second (chelate) legs are exactly alike, and reach to or considerably by the tips of the antennal scales. The ischium is a little longer than the merus; the carpus a little less than twice as long as the merus, slightly shorter than the antennal scale, and composed of about fifteen segments, of which the proximal are separated by

\*In the report on the dredgings in the region of George's Banks (Smith and Harger, Trans. Conn. Acad., iii, pp. 1-57, pls. 1-8, 1874), "*Pandalus annulicornis*" is reported from the following stations: *b*, 30 fathoms; *c*, 28 fathoms; *d*, 50 fathoms; *e*, 60 fathoms; *g*, 430 fathoms; and *q*, 45 fathoms; but on re-examining the specimens I find all those preserved from *b*, *e*, and *g* are *P. leptocerus*, the single specimen from *c* is *P. Montagu*, while from *d* and *q* there are specimens of both species.

indistinct articulations, while the four or five distal ones are separated by conspicuous articulations, of which the ultimate is about twice as long as broad, but the next three or four, each, only about half as long as broad. The chela is slender, only a very little stouter than the distal end of the carpus, nearly a third as long as the carpus, and about half as long as the merus, and the digits are alike, about as long as the basal portion, slightly gaping, and with a very few long, setiform hairs. The third, fourth, and fifth pairs of legs are exceedingly slender, sparsely armed with minute spinules and slender setæ; and the dactyli are very long and slender, slightly and regularly bent, and flattened a little vertically (or in the direction of the plane of the cervature), and wholly unarmed; the fifth pair reach beyond the tip of the rostrum, and the fourth and third pairs are successively a little longer; the dactylus in the fifth pair is a third or a little more than a third as long as the propodus, in the fourth pair a little longer than in the fifth, and in the third pair not far from half as long as the propodus.

The abdomen is evenly rounded and not at all compressed above, and less geniculated at the third segment than in *P. Montagu*. The sixth segment is about once and two-thirds as long as the fifth. The telson is about once and a half as long as the sixth segment, and terminates in an acutely triangular tip, armed each side with two long spines, of which the proximal is very much the longer, and at the extreme tip with a few long, plumose setæ.

*Measurements.*

Number.	Station.	Sex.	Length.	Carapax and rostrum.	Length of rostrum.	Breadth of carapax.	Rostrum, formula.
			mm.	mm.	mm.	mm.	
1	871, off Block Island.....	♂	42	19.2	10.0	5.1	$\frac{4+6}{8}$
2	870, off Block Island.....	♂	50	22.0	11.8	6.2	$\frac{3+7}{9}$
3	873, off Block Island.....	♀	40	16.5	8.3	5.0	$\frac{3+6}{7}$
4	879, off Block Island.....	♀	61	25.0	12.8	8.0	$\frac{2+6}{7}$



Some of the legs of these specimens give the following measurements:

Number.	Leg.	Length.	Ischium.	Merus.	Carpus.	Propodus.	Dactylus.
		mm.	mm.	mm.	mm.	mm.	mm.
1	2d.....	17.0	4.2	3.8	6.3	2.0	1.0
1	2d.....	26.0	3.0	10.0	4.7	5.3	3.0
1	5th.....	24.0	2.0	8.7	5.0	5.5	1.9
2	3d.....	28.0	3.0	11.6	4.6	5.7	2.5
2	4th.....	26.7	2.5	11.0	4.6	5.7	2.3
2	5th.....	25.2	2.5	10.0	5.1	5.0	2.0
3	4th.....	24.3	2.1	9.1	4.6	5.5	2.3
3	5th.....	23.5	2.0	8.2	5.4	5.7	1.5
4	2d.....	25.0	6.5	5.5	9.7	2.7	1.2

Stations 870, 871, 873, 877, 878, 880; 100 to 252 fathoms. Three females from 878, 142 fathoms, were carrying eggs.

The genus *Pandalus*, as at present recognized, apparently contains species representing two or more genera, and the species just described is probably not strictly congeneric with *P. Montagu*, the type species. The equal, chelate legs and the slender, unarmed dactyli of the third, fourth, and fifth pairs of legs separate *P. tenuipes* widely from *Montagu*. The oral appendages afford some characters not indicated in the above description. In *P. tenuipes* the proximal segment of the mandibular palpus is dilated, though not quite as conspicuously as in *P. Montagu*; the posterior lobe of the scaphognath of the second maxilla is very short, broad, obtusely rounded at the extremity, and projects very little back of the base of the endognath, while in *P. Montagu* and the allied species it is very much prolonged and acutely triangular posteriorly; in the second maxilliped the dactylus is about as long as broad and articulated with the oblique distal end of the propodus, while in *P. Montagu* and its allies the dactylus is a narrow plate, articulated by one edge to the distal part of the mesial edge of the propodus.

The branchiæ of *P. tenuipes* are the same in number and arranged in the same way as in *P. Montagu* and *P. borealis*; that is, there are twelve branchiæ plus seven epipods on each side; or, stated in full, the branchial formula is:

Somites.	Podo-branchiæ.	Arthro-branchiæ.	Pleuro-branchiæ.	
VII.....	0 (ep.)	0	0	= 0 (ep.)
VIII.....	1 (+ ep.)	0	0	= 1 (+ ep.)
IX.....	0 (ep.)	2	0	= 2 (+ ep.)
X.....	0 (ep.)	1	1	= 2 (+ ep.)
XI.....	0 (ep.)	1	1	= 2 (+ ep.)
XII.....	0 (ep.)	1	1	= 2 (+ ep.)
XIII.....	0 (ep.)	1	1	= 2 (+ ep.)
XIV.....	0	0	1	= 1
	1 + 7 ep.	6	5	= 12 + 7 ep.

*Penæus politus*, sp. nov.

*Male*.—The carapax and abdomen are naked and smooth and the carapax is armed with well-developed antennal, hepatic, and branchiostegial spines, but the sulci are all shallow and indistinct. The rostrum is short, acute, about two-fifths as long as the rest of the carapax, scarcely overreaches the eyes, rises obliquely from the anterior part of the carapax, and then points straight forward; its dorsal crest is armed with seven or eight teeth, of which the posterior one is just back of the orbit, while the two or three most anterior ones near the tip are small or inconspicuous and nearer together than toward the base; the lower edge is ciliated and minutely multidentate, the teeth being slender, acute, and closely crowded, so that, to the naked eye, the edge appears entire. The dorsal crest extends nearly the whole length of the carapax, but gradually fades out posteriorly, and, at about a third of the way from the base of the rostrum to the posterior border, rises into a low and obscure denticiform prominence.

The eyes are very large, obliquely compressed, and black. The peduncles of the antennulæ reach to the tips of the antennal scales; the lamelliform appendages of the basal segments are small, narrow, and do not cover the eyes above, but lie concealed between the eye-stalks; the second segments are slightly longer than the basal, while the third are not quite half as long as the second; the inner flagellum is about as long as the carapax, including the rostrum, and tapers regularly throughout its length; the outer flagellum is slightly shorter than the inner, and suddenly expanded toward the base, but the terminal portion more slender than in the inner flagellum. The antennal scales are about twice as long as the rostrum, rather more than a fourth as wide as long, and taper regularly to the broadly rounded tips. The terminal segment of the peduncle of the antenna is scarcely a fourth as long as the antennal scale, and the flagellum is slender and much longer than the whole body.

The external maxillipeds are slender, and reach a little beyond the middle of the antennal scale, and their exopods to about the middle of the carpi of the endopods. The first pair of legs reach only to the middle of the carpi of the external maxillipeds, the second pair to near the middle of the propodi, and the third and fourth pairs to the tips of the external maxillipeds, and the fifth a little beyond the tips of the fourth pair. The dactyli of the fourth and fifth pairs are slightly compressed, and only about half as long as the propodi.

The first, second, and third abdominal somites are rounded above, but the fourth, fifth, and sixth are compressed and sharply carinated dorsally. The sixth somite is very much compressed, longer than the fourth and fifth taken together, and about twice as long as high. The telson is shorter than the sixth somite, dorsally sulcated with the margins of the sulcus terminating posteriorly in a long spine either side of the tip, which is itself imperfect in the single specimen seen. The outer

lamellæ of the uropods are about as long as the sixth somite, oblong-elliptical, about four times as long as broad, and the terminal spine of the outer margin about a fourth of the way from the tip to the base. The inner lamella is a little shorter, and proportionally very slightly narrower. The bases of the first pair of abdominal legs are connected by a very large and complex sexual appendage, nearly twice as long as the bases themselves.

The only specimen seen is from station 878 (142 fathoms), and gives the following measurements:

	mm.
Length from tip of rostrum to tip of telson.....	61.0
Length of carapax and rostrum.....	20.0
Length of rostrum .....	5.6
Breadth of carapax .....	6.5
Length of antennal scale .....	11.0
Length of sixth abdominal somite .....	10.6
Length of telson .....	8.2+

**Sergestes arcticus** Krøyer, Oversigt danske Vidensk. Selsk. Forhandl. Kjöbenhavn, 1855, p. (6); Monograph. *Sergestes*, Vidensk. Selsk. Skr., v, naturvidensk. mathem. Afl., iv, pp. 240, 276, pl. 3, figs. 7, pl. 5, figs. 16, 1856.

Stations 880, 881, 891, 893, 894; 252 to 500 fathoms; thirty specimens, most of them in good condition, and several about 60<sup>mm</sup> in length.

**Sergestes**, sp.

Station 893; 372 fathoms; three specimens, over 60<sup>mm</sup> in length. The species is different from any described by Krøyer.

## SCHIZOPODA.

**Thysanopoda Norvegica** Sars.

Stations 879, 880; 225 and 252 fathoms.

**Lophogaster**, sp.

Station 870; 155 fathoms. A species very distinct from *L. typicus* Sars.

**Boreomysis arctica** G. O. Sars, Christianiafjordens Dybvandsfauna, p. 26, 1869 (extr. Nyt Magazin for Naturvidenskberne); Christiania Videnskabs-Selskabs Forhandling, 1871, p. 264 (21).—Metzger, Jahresbericht der Comm. wissensch. Untersuchung der deutschen Meere für 1872, 1873, Nordsee, p. 238, 1875.—*Mysis arctica* Krøyer, Et Bidrag til Kundskab om Krebsdyrfamilien Mysidæ, Naturhistorisk Tidsskrift, III, i, pp. 34, 42, pl. 1, fig. 5, 1861.

Station 891; 500 fathoms.

**Pseudomma roseum** G. O. Sars, Christiania Videnskabs-Selskabs Forhandling, 1869, p. 154 (10); Carcinologiske Bidrag til Norges Fauna, Mysider, part i, p. 54, pl. 4, 1870; Hardangerfjordens Fauna, Christiania Videnskabs-Selskabs Forhandling, 1871, p. 263 (20); Archiv for Mathematik og Naturvidenskab, Kristiania, ii, p. 344, 1877.—Metzger, Jahresbericht der Comm. zur wissensch. Untersuchung der deutschen Meere für 1872, 1873, Nordsee, p. 238, 1875.—Whiteaves, Report on further Deep-Sea Dredging Operations in the Gulf of St. Lawrence [in 1873], p. 16, [1874?].—Smith, Trans. Conn. Acad., v, p. 98, 1879.

Station 891; 500 fathoms.

## CUMACEA.

*Diastylis quadrispinosus* G. O. Sars.

Stations 871, 873, 878; 100 to 142 fathoms.

## STOMATOPODA.

*Lysiosquilla armata*, sp. nov.

This species appears to be closely allied to *L. spinosa* Miers, from the Indian Ocean and New Zealand, or at least more closely than to any of the other species contained in Mr. Miers's recent review of the Squillidæ (Ann. Mag. Nat. Hist., V, v, pp. 1-49, pls. 1-3, 1880).

The carapax is smooth and about once and two-thirds as long as the breadth at the anterior margin, which is about two-thirds of the greatest breadth. The rostral plate is about half as broad as the anterior part of the carapax, very slightly longer than broad, the lateral edges not angulated, but strongly convex in outline, and curved regularly round to the short but sharp and acuminate tip. The four exposed thoracic somites and the first abdominal somite increase rapidly in breadth posteriorly, but from the second to the fifth somite the abdomen is of a nearly uniform width, which is about equal to the length of the carapax. The free thoracic somites, like the anterior abdominal, are smooth and unarmed, except that the first somite projects downward either side in a lamellar, transverse, dentiform process below the posterior margin of the carapax. The five anterior abdominal somites are evenly rounded above and smooth, but the posterior edge of the fourth somite is armed either side for about a fourth of its length from the lateral margin with slender, spiniform teeth, directed backward, and the entire posterior margin of the fifth somite is armed in the same way. The sixth somite is about three times as broad as long, only a little narrower than the fifth; the postero-lateral angle each side is armed with a stout, dentiform spine, back of and within which the dorsal surface is uneven and armed with five to seven spines or tubercles, of which the two or three most posterior are slender spines, but the others more or less tuberculiform and inconspicuous; the middle portion of the dorsal surface is smooth, and the posterior margin, except a short space each side, is armed with slender, spiniform teeth, as in the fifth somite.

The telson is nearly as wide as the sixth abdominal somite and about once and two-thirds as wide as long; the middle portion of the dorsal surface rises in a smooth, oval, longitudinal area, projecting behind above the posterior margin, limited each side by a line of short spinules, and its narrow posterior extremity truncated and three-lobed or obtusely tridentate; each side of this smooth area the surface is armed with many spinules or small tubercles, showing a tendency to arrangement in longitudinal lines; the lateral margins are expanded in front of the large lateral spines of the posterior margin and armed with a few spinules; the posterior margin is armed each side with three spines, of which the



two outer are large, dentiform, and have a spinule between them, while the terminal or inner spines are smaller, slender, and movable, and separated from the large lateral spines by a space armed with three or four spinules, while the margin between the movable spines forms an obtuse, re-entering angle, each side of which is armed with a close-set series of seven to ten slender spinules.

The eyes are large, as broad as the rostral plate, and black. The antennal scale is narrowly elliptical, about three times as long as broad, and the margins ciliated. The prehensile edge of the dactylus of the large "raptorial limbs" (second maxillipeds) is armed with ten slender spines, which decrease in length distally. The bases in each of the three posterior pairs of thoracic legs are armed on the outer side with a conspicuous, acute, and somewhat hooked spine, projecting over the articulation of the next segment. The appendages of the antipennultimate segments of the three posterior pairs of thoracic legs are lamellar and broadly elliptical, though those of the anterior pair are a little shorter and those of the posterior pair slightly narrower than the others. The base of the uropods is armed above with a spinulose crest, running from the base to the articulation of the outer ramus, and at the distal end below with two dentiform spines as long as the inner ramus, below the articulation of which there is another but much smaller spine on the base. The proximal segment of the outer ramus is crested above, the distal part of the outer edge is armed with a crowded series of stout, spiniform setæ, and the lamellar terminal segment is elliptical, nearly as long as the base, and has its edges ciliated. The inner ramus is much longer and narrower than the terminal segment of the outer ramus, which in other respects it resembles.

*Measurements.*

	♂	♀
	mm.	mm.
Length .....	38.0	47.0
Length of carapax along median line, excluding rostrum .....	7.3	10.0
Breadth of carapax at anterior margin .....	4.2	6.0
Greatest breadth of carapax .....	6.3	9.0
Length of rostral plate .....	2.1	2.6
Breadth of rostral plate .....	2.2	2.8
Greatest breadth of abdomen .....	8.0	10.2
Length of telson .....	3.8	5.0
Breadth of telson .....	6.6	8.5

Station 865, 65 fathoms (one male); 876, 120 fathoms (one somewhat mutilated female, from the stomach of *Lopholatilus*).

AMPHIPODA.

*Stegocephalus ampulla* Bell.

One specimen from station 895; 238 fathoms.

*Epimeria loricata* G. O. Sars, Archiv for Mathem. Naturvidenskab, Kristiania, iv, p. 450, 1879.

Stations 869 to 871, 879, 880, 893 to 895; 115 to 372 fathoms. Abundant at 869, 192 fathoms, and 894, 365 fathoms. Sars's specimens were



from 123 to 232 fathoms, north latitude  $75^{\circ} 30'$  to  $80^{\circ}$ , east longitude  $17^{\circ} 50'$  to  $8^{\circ} 15'$ , west of Spitzbergen.

A few, mostly small, specimens of this species were dredged at different points in the Gulf of Maine, in from 32 to 110 fathoms, 1873, 1874, and 1878, and in 88 fathoms (station 43), off Nova Scotia, in 1877. Mr. Whiteaves dredged it also in the Gulf of Saint Lawrence in 1871, 1872, and 1873. Some of these northern specimens were labeled "*Epimeria cornigera?*" by me, and have been so referred to by Mr. Whiteaves, in his reports on dredging expeditions to the Gulf of Saint Lawrence, in the *Annals and Magazine of Natural History* for November, 1872, and in the *American Journal of Science*, III, vii, 213, 1874; and by Professor Verrill, in the last named serial, vii, p. 407, 411, 1874, and ix, p. 414, 1875.

**Haploops setosa** Boeck, *Christiania Videnskabs-Selskabs Forhandling*, 1870, p. 228 (148); *Scandinav. Arktiske Amphipoder*, p. 541, pl. 30, fig. 7, 1876.—G. O. Sars, *Archiv for Mathematisk Naturvidenskab*, Kristiania, ii, p. 330, 1877.

Station 880; 252 fathoms; one specimen.

I have examined numerous specimens of this species from different parts of the Gulf of Maine, the Bay of Fundy, off Nova Scotia, and from the Gulf of Saint Lawrence (Whiteaves). In the Bay of Fundy and off Nova Scotia the specimens were dredged in from 20 to 100 fathoms.

**Ptilocheirus pinguis** Stimpson.

Stations 865 to 867, 872; 65 to 86 fathoms.

**Erichthonius difformis** Milne-Edwards.—*Cerapus rubricornis* Stimpson.—Smith, *Trans. Conn. Acad.*, iv, p. 278, 1880.

Station 861; 192 fathoms; three specimens.

**Unciola irrorata** Say.—*Glaucanome leucopis* Kröyer.—Smith, *Trans. Conn. Acad.*, iv, p. 280, 1880.

Stations 865 to 867, 869 to 872, 876, 778; 65 to 192 fathoms.

**Neohela phasma**, sp. nov.—*Neohela*, nom. nov., vice *Hela* Boeck, præoc.

This species is apparently very closely allied to *N. monstrosa* Boeck,\* but has well-developed eyes, and the propodus in the second pair of gnathopods is different in form, besides other slight differences.

*Male*.—The head is about as long as and, including the stout lateral spines, fully as broad as the first somite of the peræon excluding its epimera; the anterior edge is slightly carinated and slightly concave in outline above the bases of the antennulæ, leaving a slightly prominent and obtusely angular rostrum and a fully as prominent and more acute angle either side, just back of which the large and prominently convex eyes, salmon-colored in the recently preserved alcoholic specimen, are situated. The antennulæ are much longer than the rest of the animal;

\* Forhand. *Scandinav. Naturforskeres Kjøbenhavn*, 1860, p. 669, 1861; *Christiania Videnskabs-Selskabs Forhandling*, 1870, p. 261 (181); *Scandinav. Arktiske Amphipoder*, p. 643, pl. 32, fig. 1, 1876.

the first segment of the peduncle is nearly as long as the width of the head; the second segment is much more slender than the first and more than three times as long; the third segment is more slender than the second and considerably longer than the first; there is a well-developed secondary flagellum, as long as the third segment and composed of about nine slender segments; the primary flagellum is very slender and about one and a half times as long as the peduncle. The third segment of the peduncle of the antenna just reaches the distal end of the first segment of the peduncle of the antennula; there is a small, spiniform tubercle on the outside of the first segment, in line with the lateral spine of the head and the spiniform anterior angles of the first and second epimera. The distal portion of each antenna is wanting in the single specimen examined.

The first gnathopods are of nearly the same form as in *N. monstrosa*, as figured by Boeck, but the inferior edge of the propodus is nearly straight, and the spine at the distal end is directed straight out in line with the edge, and not downward as in the figure of *N. monstrosa*. In the second pair of gnathopods the carpus is about twice as long as broad, and has the unarmed prehensile edge much less oblique than represented in the figure of *N. monstrosa*. The first three pairs of pereopods are very nearly as in *N. monstrosa*; the last two pairs are wanting in the specimen.

The pleon is nearly as high but very much narrower than the last somites of the peraeon: the first three somites are subequal in size and very similar in form; the fourth is as long but not quite as high as the third; the fifth is not more than two-thirds as long as the fourth; the sixth is only about half as long as the fifth. The telson is partially consolidated with the sixth somite, and somewhat triangular, with an obtuse tip. The uropods are as in *N. monstrosa*.

### Measurements.

	mm.
Length from front of head to tip of telson.....	26.0
Length of head and peraeon.....	17.8
Length of antennula.....	35.0
Length of first segment of peduncle.....	2.4
Length of second segment.....	8.2
Length of third segment.....	3.2
Length of secondary flagellum.....	3.2
Length of carpus in first gnathopod.....	3.1
Breadth of same.....	1.8
Length of propodus of first gnathopod.....	2.5
Breadth of same.....	2.0
Length of dactylus.....	2.7
Length of carpus of second gnathopod.....	2.7
Breadth of same.....	1.4
Length of propodus of second gnathopod.....	2.5
Breadth of same.....	1.8
Length of dactylus.....	2.0

Station 893; 372 fathoms; one specimen.

*N. monstrosa*, the type of this remarkable genus, and heretofore the only known species, was described from a single specimen, wanting most of the antennulæ and antennæ, dredged in Christiania Fiord, in 20 to 30 fathoms; and G. O. Sars has recently recorded a single mutilated specimen, dredged in 1,215 fathoms, between Norway and Iceland, by the Norwegian expedition of 1876.

### ISOPODA.\*

*Janira alta* Harger ex Stimpson.

Stations 865 to 867, 892; 65 to 487 fathoms.

*Munnopsis typica* M. Sars.

Station 878; 142 fathoms.

*Cirolana polita* Harger ex Stimpson.

Stations 871, 873, 876; 100 to 120 fathoms.

*Gnathia cerina* Harger ex Stimpson.

Stations 865 to 867, 892; 65 to 487 fathoms.

*Syscenus infelix* Harger, Marine Isopoda of New England, Report United States Fish Commission, vi, for 1878, p. 357, 1880.

Stations 893 to 895; 238 to 372 fathoms.

The following tabular synopsis of the known geographical distribution and the bathymetrical range, as far as ascertained by the investigations on our own coast, gives the principal facts in regard to the distribution of the species, and it will also serve as a condensed list of the species enumerated in the foregoing pages. In the first column the species are checked which are known to occur in the Straits of Florida or anywhere in the Caribbean region; in the second, those known in the shallow waters (under 30 fathoms) of the south coast of New England; in the third, those known from any part of the region from Cape Cod to Labrador; in the fourth, those known to occur in Greenland; in the fifth, those known on the coasts of Northern Europe or in the eastern part of the extreme North Atlantic; and in the sixth, those known from the Mediterranean.

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\* The Isopoda have been placed in Mr. Harger's hands for determination, but he has very kindly identified for me the few species here enumerated, which, however, are only a part of the whole number obtained.

List of the species enumerated in the foregoing paper, with a tabular statement of their geographical and bathymetrical range.

	Straits of Florida, &c.	Southern New England, 1-30 fathoms.	Northern New England, &c.	Greenland.	Northern Europe, &c.	Mediterranean.	Range in depth.
<b>Brachyura:</b>							
<i>Hyas coarctatus</i> .....		x	x	x	x		0-150
<i>Colloides depressus</i> .....							65-142
<i>Euprognatha retellifera</i> .....	x						65-142
<i>Lambrus Verrillii (nov.)</i> .....	x						65-86
<i>Cancer borealis</i> .....		x	x				0-225
<i>Geryon quinquedens</i> .....			x				100-372
<i>Bathynectes longispina</i> .....	x						85-225
<i>Acanthocarpus Alexandri</i> .....	x						85-155
<i>Ethusa microphthalmus (nov.)</i> .....							85
<b>Anomura:</b>							
<i>Homola barbata</i> .....						x	86
<i>Latreillia elegans</i> .....						x	85-86
<i>Lyreidus Bairdii (nov.)</i> .....							100-120
<i>Hemipagurus socialis (nov.)</i> .....							65-155
<i>gracilis (nov.)</i> .....							65-155
<i>Parapagurus pilosimanus</i> .....			x				250-372
<i>Eupagurus bernhardus</i> .....		x	x		x		0-150
<i>Kröyeri</i> .....			x	x	x		8-430
<i>sp. nov.</i> .....							65-252
<i>Munida Caribæa?</i> .....	x ?						65-142
<b>Macrura:</b>							
<i>Aretus depressus (nov.)</i> .....							86
<i>Nephropsis aculeata (nov.)</i> .....							100-126
<i>Axius armatus (nov.)</i> .....							100-142
<i>Pontophilus Norvegicus</i> .....			x		x		101-372
<i>brevirostris (nov.)</i> .....							65-155
<i>Hippolyte securifrons</i> .....							27-252
<i>Pythocaris, sp. nov.</i> .....					x		65-142
<i>Pandalus propinquus</i> .....			x		x		116-365
<i>leptocerus (nov.)</i> .....		x	x				15-430
<i>tenuipes (nov.)</i> .....							100-252
<i>Penæus politus (nov.)</i> .....							142
<i>Sergestes arcticus</i> .....				x			252-500
<i>sp. nov.</i> .....							372
<b>Schizopoda:</b>							
<i>Thysanopoda Norvegica</i> .....			x	x	x		0-430
<i>Lophogaster, sp. nov.</i> .....							155
<i>Boreomysis arctica</i> .....				x	x		500
<i>Pseudomma roseum</i> .....			x		x		45-500
<b>Cumacea:</b>							
<i>Diastalis quadrispinosa</i> .....		x	x				2-190
<b>Stomatopoda:</b>							
<i>Lysiosquilla armata (nov.)</i> .....							65-120
<b>Amphipoda:</b>							
<i>Stegocephalus ampulla</i> .....			x	x	x		110-238
<i>Epimeria loricata</i> .....			x		x		32-372
<i>Haploops setosa</i> .....			x		x		20-252
<i>Ptilochelirus pinguis</i> .....		x	x				0-150
<i>Eriethonius difformis</i> .....		x	x		x	x ?	0-192
<i>Unciola irrorata</i> .....		x	x	x	x		0-430
<i>Neohela phasma (nov.)</i> .....							372
<b>Isopoda:</b>							
<i>Janira alta</i> .....			x				0-300
<i>Munnopsis typica</i> .....			x	x	x		60-220
<i>Cirolana polita</i> .....			x				0-150
<i>Gnathia cerina</i> .....			x				10-487
<i>Syscoenus infelix</i> .....			x				130-372

A numerical summation of the columns of the above table gives the following:

	Whole number of species.	Straits of Flor- ida, &c.	Southern New England, 1- 30 fathoms.	Northern New England, &c.	Greenland.	Northern Eu- rope, &c.	Mediterranean.
Brachyura .....	9	4	2	3	1	1	.....
Anomura .....	10	1?	1	3	1	2	..... 2
Macrura .....	13		1	3	1	3	.....
Schizopoda .....	4			2	2	3	.....
Cumacea .....	1		1	1			.....
Stomatopoda .....	1						.....
Amphipoda .....	7		3	6	2	5	..... 11
Isopoda .....	5			5	1	1	.....
Total.....	50	5	8	23	8	15	3

In addition to the above facts in regard to the distribution of the species, it should be added that two of the species, *Lyreidus Bairdii* and *Nephropsis aculeata*, belong to genera heretofore known only from the Pacific region, and each represented there by a single species only; while a third species, *Lysiosquilla armata*, has its nearest known ally in a species known only from the same region.

Of the fifty species enumerated, fourteen are described as new and three others are indicated as probably new; forty-three are here first recorded as belonging to the New England fauna south of Cape Cod; twenty-eight are new to the whole fauna from Cape Hatteras to Northern Labrador; and twenty-one are new to America, including Greenland. Of the forty-three species new to the Southern New England fauna, fifteen are now known also from the New England fauna north of Cape Cod; and of the remaining twenty-eight, four were already known from the Straits of Florida, three from Greenland and Northern Europe, and two from the Mediterranean.

NEW HAVEN, CONN., November 12, 1880.

**LIST OF THE FISHES OF THE PACIFIC COAST OF THE UNITED STATES. WITH A TABLE SHOWING THE DISTRIBUTION OF THE SPECIES.**

**By DAVID S. JORDAN and CHARLES H. GILBERT.**

The writers have been engaged during most of the present year (1880) in making investigations of the fish and fisheries of the Pacific coast of the United States, in the interest of the United States Fish Commission and the United States Census Bureau. Extensive collections have been made at each of the principal fishing ports from New Westminster to San Diego.

In the present paper a catalogue is given of the species now known to inhabit the Pacific Ocean between the mouth of Fraser's River on the north and San Diego on the south. The names of the species not



seen by the writers are placed in italics. A vertical column is given for each of the principal localities, and a cross in any column opposite the name of a species indicates that we have obtained or examined, while in the field, specimens from the locality in question. In the last column, S. indicates a general southern distribution, most usually from Point Concepcion or Monterey to Magdalena Bay or Cape San Lucas; N. indicates a general northern distribution, usually from Monterey or Cape Mendocino to Sitka, or beyond; C. indicates the distinctively Californian fauna, the abundance being usually greatest about Monterey and San Francisco. This fauna is chiefly composed of the two viviparous families *Scorpanidae* and *Embiotocidae*.

It will be noticed that the number of species obtained in Monterey Bay and about San Francisco is considerably greater than at any other points. This is partly due to the fact that these regions have more extensive fisheries than others. There is no doubt, however, that more species of fishes really occur from Monterey to Point Reyes than elsewhere on the coast. Monterey Bay is the common meeting ground of the semi-tropical and semi-arctic fish faunæ. There is nowhere an abrupt change along the coast. The three capes, Flattery, Mendocino, and Point Concepcion, are to some extent points of division.

Name.	Puget Sound.	Columbia River.	San Francisco.	Monterey Bay.	San Luis Obispo.	Santa Barbara.	San Pedro.	San Diego.	Greatest abundance.
1. <i>Mola rotunda</i> Cuvier .....				+		+	+		S.
2. <i>Diodon maculatus</i> Lac .....								+	S.
3. <i>Tetrodon politus</i> Ayres .....								+	S.
4. <i>Hippocampus ingens</i> Grd. ....								+	S.
5. <i>Siphostoma punctipinne</i> (Gill) J. & G. ....									S.
6. <i>Siphostoma leptocephalus</i> * (Grd.) Gill .....								+	S.
7. <i>Siphostoma dimidiatum</i> Gill .....						+		+	S.
8. <i>Siphostoma californiense</i> † (Storer) Gill .....	+		+	+	+	+			C.
9. <i>Anorhynchus flavidus</i> Gill .....	+			+					N.
10. <i>Gasterosteus (aculeatus) serratus</i> Ayres .....	+		+						N.
11. <i>Gasterosteus microcephalus</i> Grd. ....	+		+	+			+		C.
12. <i>Aphoristia atricauda</i> J. & G. ....								+	S.
13. <i>Pleuronichthys verticalis</i> J. & G. ....			+	+					C.
14. <i>Pleuronichthys decurrens</i> ‡ J. & G. ....			+	+					C.
15. <i>Pleuronichthys cænopus</i> Grd. ....	+		+	+	+	+	+	+	N.
16. <i>Hypsopsetta guttulata</i> (Grd.) Gill .....	+		+	+	+	+	+	+	N.
17. <i>Cynicoglossus pacificus</i> Lock .....	+		+	+	+	+	+	+	N.
18. <i>Glyptocephalus zachirus</i> Lock .....	+		+	+	+	+	+	+	C.
19. <i>Pleuronectes stellatus</i> Pallas .....	+	+	+	+	+				N.
20. <i>Lepidopsetta bilineata</i> § (Ayres) Gill .....	+		+	+					N.
21. <i>Parophrys ischyrius</i> J. & G. ....	+		+	+					N.
22. <i>Parophrys isolepis</i> (Lock.) J. & G. ....	+		+	+					N.
23. <i>Parophrys vetulus</i> Grd. ....	+		+	+		+			N.
24. <i>Citharichthys sordidus</i> (Grd.) Gthr. ....	+		+	+	+	+	+	+	N.
25. <i>Psettichthys melanostictus</i> Grd. ....	+		+	+					C.

\* *Syngnathus arundinaceus* Grd.

† *Syngnathus griseolineatus* Ayres.

‡ Nom. sp. nov. = *Pleuronichthys quadrituberculatus* J. & G. Proc. U. S. Nat. Mus. 1880, iii, 50 non

*Pleuronectes quadrituberculatus* Pallas.

§ *Pleuronectes paracneatus* Cope.

Name.	Puget Sound.	Columbia River.	San Francisco.	Monterey Bay.	San Luis Obispo.	Santa Barbara.	San Pedro.	San Diego.	Greatest abundance.
26. <i>Hippoglossoides exilis</i> J. & G. ....	+	+	+	+	+	+	+	+	C.
27. <i>Hippoglossoides elassodon</i> J. & G. ....	+	+	+	+	+	+	+	+	N.
28. <i>Hippoglossoides jordani</i> Lock. ....	+	+	+	+	+	+	+	+	C.
29. <i>Paralichthys maculosus</i> Grd. ....	+	+	+	+	+	+	+	+	S.
30. <i>Nystreus hilepis</i> J. & G. ....	+	+	+	+	+	+	+	+	N.
31. <i>Hippoglossus vulgaris</i> Flem. ....	+	+	+	+	+	+	+	+	N.
32. <i>Atheresthes stomias</i> J. & G. ....	+	+	+	+	+	+	+	+	N.
33. <i>Merluccius productus</i> (Ayres) Gill. ....	+	+	+	+	+	+	+	+	N.
34. <i>Pollachius chalcogrammus</i> * (Pallas) J. & G. ....	+	+	+	+	+	+	+	+	N.
35. <i>Gadus morhua</i> L. ....	+	+	+	+	+	+	+	+	N.
36. <i>Microgadus proximus</i> (Grd.) Gill. ....	+	+	+	+	+	+	+	+	N.
37. <i>Brosomphycis marginatus</i> (Ayres) Gill. ....	+	+	+	+	+	+	+	+	C.
38. <i>Ophidium taylori</i> Grd. ....	+	+	+	+	+	+	+	+	C.
39. <i>Scytalina cerdale</i> J. & G. ....	+	+	+	+	+	+	+	+	N.
40. <i>Lycodopsis paucidens</i> (Lock.) Gill. ....	+	+	+	+	+	+	+	+	C.
41. <i>Lycodopsis pacificus</i> Collett. ....	+	+	+	+	+	+	+	+	N.
42. <i>Anarrhichthys ocellatus</i> Ayres. ....	+	+	+	+	+	+	+	+	N.
43. <i>Lumpenus anguillaris</i> (Pallas) Gill. ....	+	+	+	+	+	+	+	+	N.
44. <i>Xiphister mupestris</i> J. & G. ....	+	+	+	+	+	+	+	+	N.
45. <i>Xiphister mucosus</i> † (Grd.) Jor. ....	+	+	+	+	+	+	+	+	N.
46. <i>Xiphister chirus</i> J. & G. ....	+	+	+	+	+	+	+	+	N.
47. <i>Cebedichthys violaceus</i> Grd. ....	+	+	+	+	+	+	+	+	C.
48. <i>Anoplarchus alectrolophus</i> ‡ (Pallas) J. & G. ....	+	+	+	+	+	+	+	+	N.
49. <i>Apodichthys flavidus</i> Grd. ....	+	+	+	+	+	+	+	+	C.
50. <i>Apodichthys fuscum</i> J. & G. ....	+	+	+	+	+	+	+	+	C.
51. <i>Muraenoides ornatus</i> (Grd.) Gill. ....	+	+	+	+	+	+	+	+	N.
52. <i>Muraenoides latus</i> (Cope) Gill. ....	+	+	+	+	+	+	+	+	N.
53. <i>Cremnabates integripinnis</i> Rosa Smith. ....	+	+	+	+	+	+	+	+	S.
54. <i>Gibbonsia elegans</i> Cooper. ....	+	+	+	+	+	+	+	+	S.
55. <i>Heterostichus rostratus</i> Grd. ....	+	+	+	+	+	+	+	+	S.
56. <i>Neoclinus blanchardi</i> Grd. ....	+	+	+	+	+	+	+	+	S.
57. <i>Neoclinus satiricus</i> Grd. ....	+	+	+	+	+	+	+	+	S.
58. <i>Hypoleurochilus gentilis</i> (Grd.) Gill. ....	+	+	+	+	+	+	+	+	S.
59. <i>Porichthys porosissimus</i> (Cuv. & Val.) Gthr. ....	+	+	+	+	+	+	+	+	C.
60. <i>Gobiesox reticulatus</i> Grd. ....	+	+	+	+	+	+	+	+	N.
61. <i>Eumicrotremus orbis</i> (Gthr.) Gill. ....	+	+	+	+	+	+	+	+	N.
62. <i>Neoliparis mucosus</i> (Ayres) Steind. ....	+	+	+	+	+	+	+	+	N.
63. <i>Liparis cyclopus</i> Gthr. ....	+	+	+	+	+	+	+	+	N.
64. <i>Liparis pulchellus</i> Ayres. ....	+	+	+	+	+	+	+	+	N.
65. <i>Aspidophoroides inermis</i> Gthr. ....	+	+	+	+	+	+	+	+	N.
66. <i>Brachyopsis verrucosus</i> Lock. ....	+	+	+	+	+	+	+	+	C.
67. <i>Brachyopsis xyosternus</i> J. & G. ....	+	+	+	+	+	+	+	+	C.
68. <i>Podothecus acipenserinus</i> (Pallas) Gill. ....	+	+	+	+	+	+	+	+	C.
69. <i>Podothecus vulsus</i> J. & G. ....	+	+	+	+	+	+	+	+	C.
70. <i>Podothecus trispinosus</i> (Lock.) J. & G. ....	+	+	+	+	+	+	+	+	C.
71. <i>Bothragonus swani</i> (Steind.) Gill. ....	+	+	+	+	+	+	+	+	N.
72. <i>Prionotus stephanophrys</i> Lock. ....	+	+	+	+	+	+	+	+	S.
73. <i>Ascelichthys rhodurus</i> J. & G. ....	+	+	+	+	+	+	+	+	N.
74. <i>Psychrolutes paradoxus</i> Gthr. ....	+	+	+	+	+	+	+	+	N.
75. <i>Cottus polyacanthocephalus</i> Pallas. ....	+	+	+	+	+	+	+	+	N.
76. <i>Artedius lateralis</i> Grd. ....	+	+	+	+	+	+	+	+	N.
77. <i>Artedius notospilotus</i> Grd. ....	+	+	+	+	+	+	+	+	C.
78. <i>Artedius quadriseriatus</i> Lock. ....	+	+	+	+	+	+	+	+	C.
79. <i>Artedius pugettensis</i> Steind. ....	+	+	+	+	+	+	+	+	C.
80. <i>Hemilepidotus spinosus</i> Ayres. ....	+	+	+	+	+	+	+	+	C.
81. <i>Hemilepidotus gibbsi</i> Gill. ....	+	+	+	+	+	+	+	+	N.
82. <i>Aspicottus bison</i> Grd. ....	+	+	+	+	+	+	+	+	N.
83. <i>Scorpenichthys marmoratus</i> Grd. ....	+	+	+	+	+	+	+	+	C.

\* *Gadus periscopus* Cope.† *Gadus avaratus* Cope; *Gadus morrhua* L. (fide Bean.) = *G. macrocephalus* Tiles.‡ *Xiphidium cruceum* Cope.§ *Opidium atropurpureum* Kittlitz = *Anoplarchus crista-galli* Gthr.

Name.	Puget Sound.	Columbia River.	San Francisco.	Monterey Bay.	San Luis Obispo.	Santa Barbara.	San Pedro.	San Diego.	Greatest abundance.
84. <i>Leptocottus armatus</i> Grd.	+		+	+	+	+	+	+	S.
85. <i>Liocottus hirundo</i> Girard.	+					+			S.
86. <i>Oligocottus globiceps</i> Grd.	+		+	+					N.
87. <i>Oligocottus maculosus</i> Grd.	+		+	+	+				N.
88. <i>Oligocottus analis</i> Grd.				+			+	+	N.
89. <i>Blepsias cirrhosus</i> (Pallas) Gthr.	+		+						N.
90. <i>Nautichthys oculo-fasciatus</i> Grd.	+		+						N.
91. <i>Scorpaena guttata</i> Grd.						+	+	+	S.
92. <i>Sebastichthys nigrocinetus</i> (Ayres) Gill.	+		+	+					N.
93. <i>Sebastichthys serripes</i> J. & G.			+	+		+	+	+	S.
94. <i>Sebastichthys nebulosus</i> (Ayres) Gill.	+		+	+					N.
95. <i>Sebastichthys chrysomelas</i> J. & G.			+	+		+	+		C.
96. <i>Sebastichthys carnatus</i> J. & G.			+	+	+	+	+		C.
97. <i>Sebastichthys maliger</i> J. & G.	+		+	+					N.
98. <i>Sebastichthys caurinus</i> (Rich.) J. & G.	+								N.
var. <i>vexillaris</i> J. & G.			+	+		+	+	+	C.
99. <i>Sebastichthys rastrelliger</i> J. & G.			+	+	+	+	+		S.
100. <i>Sebastichthys auriculatus</i> (Grd.) Gill.	+		+	+	+	+			C.
101. <i>Sebastichthys rubrivinctus</i> J. & G.				+		+			C.
102. <i>Sebastichthys chlorostictus</i> J. & G.			+	+					C.
103. <i>Sebastichthys rhodochloris</i> J. & G.			+	+					C.
104. <i>Sebastichthys rosaceus</i> (Grd.) Lock.			+	+		+			C.
105. <i>Sebastichthys constellatus</i> J. & G.			+	+		+			C.
106. <i>Sebastichthys ruber</i> (Ayres) Lock.	+		+	+		+			N.
107. <i>Sebastichthys miniatus</i> J. & G.			+	+		+	+		C.
108. <i>Sebastichthys pinniger</i> (Gill) Lock.	+		+	+					N.
109. <i>Sebastichthys atrovirens</i> J. & G.					+	+	+		C.
110. <i>Sebastichthys elongatus</i> (Ayres) Gill.			+	+		+			C.
111. <i>Sebastichthys proriger</i> J. & G.			+						C.
112. <i>Sebastichthys ovalis</i> (Ayres) Lock.			+			+			C.
113. <i>Sebastichthys entomelas</i> J. & G.			+	+					C.
114. <i>Sebastichthys mystinus</i> J. & G.	+		+	+		+	+	+	C.
115. <i>Sebastichthys melanops</i> (Grd.) J. & G.	+		+	+					N.
116. <i>Sebastichthys flavidus</i> (Ayres) Lock.			+	+		+	+		C.
117. <i>Sebastes paucispinis</i> (Ayres) Gill.			+	+	+	+	+		C.
118. <i>Hexagrammus asper</i> † Steller.	+								N.
119. <i>Hexagrammus superciliosus</i> ‡ (Pallas) J. & G.	+		+	+					N.
120. <i>Hexagrammus decagrammus</i> § (Pallas) J. & G.	+		+	+	+				N.
121. <i>Hexagrammus nebulosus</i> (Grd.) J. & G.									N.
122. <i>Ophiodon elongatus</i> Grd.	+		+	+	+	+			N.
123. <i>Zaniolepis latipinnis</i> Grd.									N.
124. <i>Oxylebius pictus</i> Gill.	+		+	+					N.
125. <i>Myriolepis zonifer</i> Lock.									C.
126. <i>Anoplopoma fimbria</i> (Pallas) Gill.	+		+	+					N.
127. <i>Gobius glavenfrantum</i> (Gill) J. & G.									N.
128. <i>Lepidogobius gracilis</i> (Grd.) Gill.	+		+						C.
129. <i>Lepidogobius newberryi</i> (Grd.) Gill.									C.
130. <i>Gillichthys mirabilis</i> Cooper.	+		+			+	+	+	S.
131. <i>Crystallogobius eos</i> Rosa Smith Mss.								+	S.
132. <i>Trichodon stelleri</i> Cuv. & Val.									N.
133. <i>Caulolatilus anomalus</i> (Cooper) Gill.				+		+	+	+	S.
134. <i>Bathymaster signatus</i> Cope.	+								N.
135. <i>Ichthyus lockingtoni</i> J. & G.			+						N.
136. <i>Iceustus enigmatius</i> Lock.			+						N.
137. <i>Trachypterus</i> ¶ ?ativaldis Kuer.									N.
138. <i>Hypsypops rubicundus</i> (Grd.) Gill.						+	+	+	S.
139. <i>Chronis punctipinnis</i> Cooper.						+	+	+	S.
140. <i>Pseudojulis modestus</i> (Grd.) Gthr.				+		+	+		S.
141. <i>PlatyGLOSSUS semicinctus</i> (Ayres) Gthr.									S.
142. <i>Pimelometopon pulcher</i> (Ayres) Gill.				+		+	+	+	S.

\* Nom. sp. nov.—*Sebastes melanops* Ayres, non *Sebastes melanops* Grd.

† *Sebastesomus simulans* Gill.

‡ *Chirus trigrammus* Cope.

§ *Chirus pictus* Grd.; *Chirus balius* Cope.

¶ *Chirus guttatus* Grd. (♀); *Chirus constellatus* Grd. (♂); *Chirus maculosus* Lock. (♀).

¶ Taken at Santa Cruz by Dr. C. L. Anderson, and at Cape Flattery by James G. Swan.

Name.	Puget Sound.	Columbia River.	San Francisco.	Monterey Bay.	San Luis Obispo.	Santa Barbara.	San Pedro.	San Diego.	Greatest abundance.
143. <i>Abeona minima</i> (Gibbons) Gill	.....	.....	+	+	+	+	.....	+	C.
144. <i>Abeona aurora</i> J. & G	.....	.....	.....	.....	.....	.....	.....	.....	C.
145. <i>Cymatogaster aggregatus</i> Gibbons	+	.....	+	+	+	+	+	+	C.
146. <i>Brachyistius frenatus</i> Gill	+	.....	.....	.....	.....	.....	.....	.....	C.
147. <i>Brachyistius rosaceus</i> J. & G	.....	.....	+	.....	.....	.....	.....	.....	C.
148. <i>Holconotus analis</i> (A. Agassiz) J. & G	.....	.....	.....	+	+	+	.....	.....	C.
149. <i>Holconotus argenteus</i> (Gibbons) J. & G	.....	.....	+	+	+	+	+	+	C.
150. <i>Holconotus agassizi</i> (Gill) J. & G	.....	.....	+	+	+	+	.....	.....	C.
151. <i>Holconotus rhodoterus</i> Ag.	.....	.....	+	+	+	+	.....	.....	C.
152. <i>Amphistichus argenteus</i> Ag.	.....	.....	+	+	+	+	+	+	C.
153. <i>Hypsurus caryi</i> (L. Agass.) A. Agass.	.....	.....	+	+	+	+	.....	.....	C.
154. <i>Ditrema</i> * <i>jacksoni</i> (Agass.) Günther	+	.....	+	+	+	+	+	+	C.
155. <i>Ditrema laterale</i> (Agass.) Günther	+	.....	+	+	+	+	.....	.....	N.
156. <i>Ditrema atripes</i> J. & G	.....	.....	.....	.....	.....	.....	.....	.....	C.
157. <i>Ditrema furcatum</i> (Grd.) Gthr	.....	.....	+	+	+	+	+	+	C.
158. <i>Damalichthys argyrosomus</i> (Grd.) J. & G	+	.....	+	+	+	+	+	.....	N.
159. <i>Rhacochilus toxotes</i> Agass	.....	.....	+	+	+	+	+	.....	C.
160. <i>Parephippus faber</i> † (Bloch) Gill	.....	.....	.....	.....	.....	.....	.....	.....	S.
161. <i>Genyonemus lineatus</i> (Ayres) Gill	.....	.....	+	+	+	+	+	.....	C.
162. <i>Corvina saturna</i> (Grd.) Gthr	.....	.....	.....	.....	.....	.....	.....	+	S.
163. <i>Roncador stearnsi</i> (Steind.) J. & G	.....	.....	.....	.....	.....	.....	.....	+	S.
164. <i>Umbrina xanti</i> † Gill	.....	.....	.....	.....	.....	.....	.....	+	S.
165. <i>Menticirrhus undulatus</i> § (Grd.) Gill	.....	.....	.....	.....	.....	.....	.....	+	S.
166. <i>Cynoscion nobilis</i> (Ayres)¶ J. & G	.....	.....	+	+	.....	.....	.....	+	S.
167. <i>Cynoscion parvipinnis</i> ¶ Ayres	.....	.....	.....	.....	.....	.....	.....	+	S.
168. <i>Scorpius politus</i> Ayres	.....	.....	+	+	+	+	.....	+	S.
169. <i>Girella nigricans</i> (Ayres) Gill	.....	.....	.....	+	.....	.....	.....	.....	S.
170. <i>Scorpius californiensis</i> Steind.	.....	.....	.....	.....	.....	.....	.....	.....	S.
171. <i>Xenichthys californiensis</i> Steind.	.....	.....	.....	.....	.....	.....	.....	.....	S.
172. <i>Pristipoma davidsoni</i> Steind.	.....	.....	.....	.....	.....	.....	.....	.....	S.
173. <i>Stereolepis gigas</i> Ayres	.....	.....	.....	+	.....	.....	.....	.....	S.
174. <i>Serranus clathratus</i> (Grd.) Steind	.....	.....	.....	+	.....	.....	.....	.....	S.
175. <i>Serranus nebulifer</i> (Grd.) Steind.	.....	.....	.....	+	.....	.....	.....	.....	S.
176. <i>Serranus maculofasciatus</i> Steind.	.....	.....	.....	.....	.....	.....	.....	.....	S.
177. <i>Stromateus simillimus</i> (Ayres) Gill	+	.....	+	+	+	+	.....	.....	C.
178. <i>Trachurus saurus</i> Raf	.....	.....	.....	+	.....	.....	.....	.....	S.
179. <i>Caranx caballus</i> Gthr	.....	.....	.....	.....	.....	.....	.....	.....	S.
180. <i>Seriola lalandi</i> ** Cuv. & Val.	.....	.....	.....	.....	.....	.....	.....	.....	S.
181. <i>Oreynus alalonga</i> †† (Gmel.) Risso	.....	.....	.....	+	.....	.....	.....	.....	S.
182. <i>Sarda chilensis</i> †† (C. & V.) J. & G	.....	.....	.....	+	.....	.....	.....	.....	S.
183. <i>Scomberomorus concolor</i> §§ (Lock.) J. & G	.....	.....	.....	.....	.....	.....	.....	.....	S.
184. <i>Scomber pneumatophorus</i>     De la Roche	.....	.....	.....	+	.....	.....	.....	.....	S.
185. <i>Xiphias gladius</i> L	.....	.....	.....	.....	.....	.....	.....	.....	S.
186. <i>Romora jacobea</i> (Lowe) Gill	.....	.....	.....	.....	.....	.....	.....	.....	S.
187. <i>Echeneis naucrates</i> L	.....	.....	.....	.....	.....	.....	.....	.....	S.
188. <i>Anmodytes (tobianus) personatus</i> Grd	+	.....	.....	+	.....	.....	.....	.....	N.
189. <i>Sphyræna argentea</i> Grd	.....	.....	.....	+	.....	.....	.....	.....	S.
190. <i>Atherinopsis californiensis</i> (Grd.) Gill	.....	.....	.....	.....	.....	.....	.....	.....	C.
191. <i>Atherinops affinis</i> (Ayres) Steind	.....	.....	.....	.....	.....	.....	.....	.....	C.
192. <i>Leuresthes tenuis</i> (Ayres) J. & G	.....	.....	.....	.....	.....	.....	.....	.....	S.

\* We are informed by Dr. Günther that the pharyngeals in *Ditrema temminckii* are of the normal type as in *Embiotoca*. *Ditrema* is therefore identical with *Phanerodon* Grd., and no character of importance distinguishes "*Phanerodon*" from *Embiotoca*. *Embiotoca argyrosoma* Grd., is identical with *Damalichthys vacca*.

† *Ephippas zonatus* Grd.

†† *Umbrina undulata* Steind., non Grd.

§ *Umbrina elongata* Gthr.

|| *Otolithus californiensis* Steind.

¶ *Otolithus magdalenæ* Steind.

\*\* *Seriola mazatlanæ* Steind.

†† *Oreynus pacificus* Cooper.

‡† *Pelamys lineolata* Grd.

§§ *Chromitra concolor* Lock.; *Chromitra* Lock.=*Cybium* C. & V.=*Scomberomorus* Lac.

||| *Scomber diego* Ayres.



Name.	Puget Sound.	Columbia River.	San Francisco.	Monterey Bay.	San Luis Obispo.	Santa Barbara.	San Pedro.	San Diego.	Greatest abundance.
193. <i>Mugil mexicanus</i> Steind.	+	+	+	+	+	+	+	+	S.
194. <i>Tylosurus exilis</i> (Grd.) J. & G.	+	+	+	+	+	+	+	+	S.
195. <i>Scomberesox brevirostris</i> Peters	+	+	+	+	+	+	+	+	S.
196. <i>Hemirhamphus rosæ</i> J. & G.	+	+	+	+	+	+	+	+	S.
197. <i>Exocoetus californicus</i> Cooper	+	+	+	+	+	+	+	+	S.
198. <i>Cyprinodon californiensis</i> Grd.	+	+	+	+	+	+	+	+	S.
199. <i>Fundulus parvipinnis</i> Grd.	+	+	+	+	+	+	+	+	S.
200. <i>Myctophum procellarum</i> Bean Mss	+	+	+	+	+	+	+	+	N.
201. <i>Myctophum crenulare</i> J. & G.	+	+	+	+	+	+	+	+	S.
202. <i>Synodus lucioceps</i> (Ayres) Gill	+	+	+	+	+	+	+	+	S.
203. <i>Paralepis coruscans</i> J. & G.	+	+	+	+	+	+	+	+	S.
204. <i>Sudis ringens</i> J. & G.	+	+	+	+	+	+	+	+	S.
205. <i>Alepidosaurus borealis</i> Gill	+	+	+	+	+	+	+	+	N.
206. <i>Osmernus thaleichthys</i> Ayres	+	+	+	+	+	+	+	+	N.
207. <i>Osmernus attenuatus</i> Lock	+	+	+	+	+	+	+	+	C.
208. <i>Hypomesus olidus</i> (Pallas) Gill	+	+	+	+	+	+	+	+	N.
209. <i>Thaleichthys pacificus</i> (Rich.) Grd	+	+	+	+	+	+	+	+	N.
210. <i>Salvelinus malma</i> * (Walb.) J. & G.	+	+	+	+	+	+	+	+	N.
211. <i>Salmo purpuratus</i> Pallas	+	+	+	+	+	+	+	+	N.
212. <i>Salmo irideus</i> Gibbons	+	+	+	+	+	+	+	+	C.
213. <i>Salmo gairdneri</i> Rich	+	+	+	+	+	+	+	+	N.
214. <i>Oncorhynchus kennerlyi</i> (Suckl.) Jor	+	+	+	+	+	+	+	+	N.
215. <i>Oncorhynchus gorbushat</i> (Walb.) Gill & Jor.	+	+	+	+	+	+	+	+	N.
216. <i>Oncorhynchus keta</i> † (Walb.) Gill & Jor.	+	+	+	+	+	+	+	+	N.
217. <i>Oncorhynchus kisutch</i> ‡ (Walb.) J. & G.	+	+	+	+	+	+	+	+	N.
218. <i>Oncorhynchus tshawytscha</i> (Walb.) J. & G.	+	+	+	+	+	+	+	+	N.
219. <i>Oncorhynchus nerka</i>    (Walb.) Gill & Jor	+	+	+	+	+	+	+	+	N.
220. <i>Stolephorus ringens</i> (Jenyns) J. & G.	+	+	+	+	+	+	+	+	S.
221. <i>Stolephorus delicatissimus</i> (Grd.) J. & G.	+	+	+	+	+	+	+	+	S.
222. <i>Stolephorus compressus</i> (Grd.) J. & G.	+	+	+	+	+	+	+	+	S.
223. <i>Clupea sagax</i> Jenyns	+	+	+	+	+	+	+	+	N.
224. <i>Clupea mirabilis</i> Grd	+	+	+	+	+	+	+	+	N.
225. <i>Albula vulpes</i> (L.) Goode	+	+	+	+	+	+	+	+	S.
226. <i>Nemichthys avocetta</i> J. & G.	+	+	+	+	+	+	+	+	N.
227. <i>Myrichthys tigrinus</i> Grd	+	+	+	+	+	+	+	+	N.
228. <i>Ophichthys triserialis</i> (Kaup) Gthr	+	+	+	+	+	+	+	+	S.
229. <i>Muraena mordax</i> Ayres	+	+	+	+	+	+	+	+	S.
230. <i>Acipenser transmontanus</i> ¶ Rich.	+	+	+	+	+	+	+	+	N.
231. <i>Acipenser medirostris</i> ** Ayres	+	+	+	+	+	+	+	+	N.
232. <i>Chimaera colliaci</i> Bennett	+	+	+	+	+	+	+	+	N.
233. <i>Manta birostris</i> †† (Walb.) J. & G.	+	+	+	+	+	+	+	+	S.
234. <i>Myliobatis californicus</i> Gill	+	+	+	+	+	+	+	+	S.
235. <i>Aetobatis laticeps</i> Gill	+	+	+	+	+	+	+	+	S.
236. <i>Pteroplatea marmorata</i> Cooper	+	+	+	+	+	+	+	+	S.
237. <i>Dasybatus dipterurus</i> J. & G.	+	+	+	+	+	+	+	+	S.
238. <i>Urolophus halleri</i> Cooper	+	+	+	+	+	+	+	+	S.
239. <i>Raja binoculata</i> Grd. ‡‡	+	+	+	+	+	+	+	+	N.
240. <i>Raja rhina</i> J. & G.	+	+	+	+	+	+	+	+	N.
241. <i>Raja inornata</i> J. & G. Mss	+	+	+	+	+	+	+	+	C.
var. <i>inermis</i> J. & G. Mss.	+	+	+	+	+	+	+	+	C.
242. <i>Raja stellulata</i> J. & G.	+	+	+	+	+	+	+	+	C.

\* *Salmo spectabilis* Grd.; *Salmo bairdi*, etc., Suckley; *Salmo callarias* Pallas.

† *Salmo scouleri* Rich., non Suckl.

‡ *Salmo sanguinolentus* Pallas; *Salmo tsuppitch* Rich.; *Salmo scouleri* Suckl.

§ *Salmo lycaodon* Pallas, non Gthr.; *Salmo puicidens* Rich.

|| *Salmo lagocephalus* Pallas; *Salmo canis* Suckl.

¶ *Acipenser brachyrhynchus* et *acutirostris* Ayres.

\*\* *Acipenser acutirostris* Gthr.

†† *Raja birostris* Walb.; *Manta americana* Bancroft; *Ceratoptera vampyrus* Auct.

‡‡ *Raja binoculata* Grd. = *yg. of Raja cooperi* Grd.



Name.	Puget Sound.	Columbia River.	San Francisco.	Monterey Bay.	San Luis Obispo.	Santa Barbara.	San Pedro.	San Diego.	Greatest abundance.
243. <i>Zapteryx exasperatus</i> J. & G. ....								+	S.
244. <i>Rhinobatus triseriatus</i> J. & G. ....			+			+	+	+	S.
245. <i>Rhinobatus productus</i> Ayres .....			+		+	+	+	+	S.
246. <i>Torpedo californica</i> Ayres .....			+	+					C.
247. <i>Squatina angelus</i> Dum. ....			+	+		+	+	+	S.
248. <i>Somniosus microcephalus</i> (Bloch) Gill .....	+								N.
249. <i>Squalus acanthias</i> L. ....	+		+	+		+			N.
250. <i>Heterodontus francisci</i> (Grd.) Gill .....						+	+	+	S.
251. <i>Notorhynchus maculatus</i> Ayres .....			+	+					C.
252. <i>Hexanchus corinus</i> J. & G. ....	+			+					C.
253. <i>Catulus ventri sus</i> * (Garman) J. & G. ....				+		+	+		S.
254. <i>Mustelus hinnulus</i> (Blainv.) J. & G. ....			+	+		+	+	+	S.
255. <i>Rhinotriakis henlei</i> Gill .....			+	+		+	+	+	C.
256. <i>Triakis semifasciatus</i> Grd. ....			+	+		+	+	+	C.
257. <i>Galeorhinus galeus</i> (L.) Blainv. ....			+	+		+	+	+	S.
258. <i>Galeocerdo tigrinus</i> M. & H. ....						+	+	+	S.
259. <i>Carcharhinus glaucus</i> (L.) Blainv. ....	+		+						C.
260. <i>Eulamia lamia</i> (Risso) Gill .....								+	S.
261. <i>Sphyrna zygaena</i> (L.) Raf .....									S.
262. <i>Cetorhinus maximus</i> (L.) Blainv. ....				+					C.
263. <i>Carcharodon carcharias</i> † (L.) J. & G. ....				+					S.
264. <i>Isurus oxyrinchus</i> Raf .....							+		S.
265. <i>Lamna cornubica</i> (Gmel.) Flem .....				+					C.
266. <i>Alopias vulpes</i> (Gmel.) Bon .....				+					C.
267. <i>Entosphenus tridentatus</i> (Rich.) Gill .....		+		+					N.
268. <i>Ammocetes plumbeus</i> (Ayres) J. & G. ....	+		+						N.
269. <i>Polistotrema dombeyi</i> ‡ (Muller) Gill .....			+	+					S.
270. <i>Branchiostoma lanceolatum</i> (Pallas) Gray .....									S.
Totals .....	90	14	145	148	43	99	80	83	

Species most abundant northward (Alaskan fauna) .....	96
Species most abundant centrally (Californian fauna) .....	76
Species most abundant southward (Lower Californian fauna) .....	98

Total .....	270
Species found also in Atlantic Ocean .....	28
Species not obtained by the Commission .....	15
Species not recorded by previous writers .....	66

\* *Cephaloscyllium laticeps* J. & G., probably not of Duméril.

† *Carcharodon rondeleti* M. & H.

‡ *Bdellostoma polytrema* Grd.; *Bdellostoma stouti* Lock.

INDIANA STATE UNIVERSITY,  
 Bloomington, November 30, 1880.

ON THE GENERIC RELATIONS OF *BELONE EXILIS* GIRARD.

By DAVID S. JORDAN and CHARLES H. GILBERT.

The "needle-fish" (*Belone exilis* Girard), of the California coast, differs from the type of the genus *Belone* in the development of the gill-rakers. In *Belone vulgaris* the gill-rakers are well developed, long, and slender, and a patch of teeth is present on the vomer. In *Belone exilis* the gill-rakers are entirely wanting, and there are no vomerine teeth. The gill-rakers are also wanting in the Atlantic species, *Belone longirostris* (Mitch.), *Belone latimana* Poey, *Belone melanochira* Poey, *Belone notata* Poey, and *Belone hians* (Cuv. & Val.), and probably also in *Belone cantraini*, which is the type of the genus *Tylosurus* Cocco. The generic name *Tylosurus* may therefore be provisionally adopted for the species of *Belone* without gill-rakers. The caudal keel on which the genus *Tylosurus* was based, and which is developed in *T. exilis* as in *T. cantraini*, has apparently no systematic importance.

BLOOMINGTON, IND., December 2, 1880.

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## NOTES ON A COLLECTION OF FISHES FROM UTAH LAKE.

By DAVID S. JORDAN and CHARLES H. GILBERT.

A short visit to Provo, Utah, on Utah Lake, enabled one of the writers to make a small collection of the fishes of that locality. This collection has been since supplemented by an excellent series of the different species, presented to the United States National Museum by Peter Madsen and sons, fishermen at Provo. Four of the thirteen species obtained seem to be new to science.

1. *Cottopsis semiscaber* Cope.—Bull-head.

Two specimens. Professor Cope says of his types: "Skin prickly above the lateral line, smooth below it posteriorly." Our specimens are villous above and below, as in *Cottopsis asper*, from which *C. semiscaber* differs chiefly in the less number of rays in the vertical fins.

The genus *Cottopsis* is distinguished from *Centridermichthys* mainly by the absence of a slit behind the fourth gill, which, as I am informed by Dr. Günther, is present in *Centridermichthys fasciatus*. *Centridermichthys uncinatus*, of the North Atlantic, agrees with *Cottopsis* in this respect, and should probably be referred to it. The American genera of Cot-

toids may be divided into two series, on the presence or absence of this slit, as follows:

Without slit.	With slit.
Ascelichthys.	Blepsias.
Psychrolutes.*	Nautichthys.
Cottunculus.	Blennicottus.
Uranidea.	Oligocottus.
Cottopsis (including Tauridea and Potamocottus).	Leptocottus.
Cottus.†	Scorpenichthys.
Artedius.	Liocottus.
Hemitripteris.	Triglopsis (including Oncocottus).
	Gymnacanthus.
	Aspicottus.
	Icelus.
	Triglops.
	Hemilepidotus.
	Melleles.

2. *Coregonus williamsoni* Grd.—*Mountain Herring*.

Very abundant.

3. *Salmo purpuratus* Pallas.—*Lake Trout*; *Brook Trout*.

(*Salmo clarki* Rich.)

Very abundant in Utah Lake; a food-fish of much value.

Specimens obtained do not differ in any visible respect from others taken in salt water in Puget Sound. This is apparently the parent stock from which *S. spilurus*, *S. irideus*, and *S. gairdneri* Rich., (*S. truncatus* Suckley) have scarcely yet become completely differentiated. *S. henshawi* Gill & Jor. is a marked local variety of *S. purpuratus*.

4. *Squalius tænia* (Cope) J. & G.—*Leather-side Minnow*.

Very abundant. We find it impossible to separate the genera *Squalius*, *Telestes*, *Tigoma*, *Siboma*, *Cheonda*, and *Clinostomus*, and we adopt for the whole group the name of *Squalius*. The genus *Dobula* was established by Rafinesque in the *Ichthyologia Ohiensis* (1820, p. 45). Although no type is stated, it was probably based on the *Cyprinus dobula* L., afterwards the type of *Squalius* Bonaparte.

5. *Squalius montanus* (Cope) J. & G.

Also abundant.

6. *Squalius cruoreus*, sp. nov.

Allied to *Squalius ardesiacus* Cope, but with larger scales and shorter head.

\* We are unable to perceive any distinction between the *Psychrolutidæ* and the *Cottidæ*. *Psychrolutes* has a rudimentary spinous dorsal, hidden in the loose skin.

† In *Cottus grænlandicus*, *polyacanthocephalus*, and *scorpius* a small pore is present behind the last gill. In other species (*octodecimspinosus æneus*, *scorpioides*), the slit appears to be wholly obliterated. In a specimen of *C. polyacanthocephalus* of about two feet in length there is visible a minute pore representing the usual last slit.

Form of the species termed "*Clinostomus*", but less compressed. Body moderately elongate, somewhat compressed, symmetrical, the back considerably arched; caudal peduncle rather stout. Head subconical, laterally compressed, broad and rounded above; mouth short, oblique, jaws about equal. Premaxillary in front on the level of the lower edge of the pupil; maxillary reaching to opposite the front of the eye. Eye large, about as long as snout,  $4\frac{1}{2}$  in head. Isthmus narrow; scales firm, not closely imbricated; the belly with imbedded scales. Lateral line complete, running low, but not greatly decurved. Dorsal fin inserted a little behind the ventrals, scarcely nearer base of caudal than snout. Caudal fin evenly forked. Pectorals shortish, not reaching nearly to the ventrals; the ventrals reaching to the vent. Head contained 4 times in length to base of caudal; greatest depth equal to length of head. Fin-rays: Dorsal 9; anal 8. Scales 11-55-6. Teeth 2, 5-4, 2, without evident masticatory surface. This latter character is, however, so variable in the Cyprinoids of this type as to be scarcely even of specific value. Back and fins dusky bluish; sides of body and head dark, with fine punctulations; a red spot at base of each ventral and of anal.

Numerous specimens, the longest 6 inches in length. This species is related to *S. ardesiacus* (Cope), but it has a deeper body and larger scales, the pectorals are shorter and length of the head proportionately less.

7. *Squalius copei*, sp. nov.

(*Hybopsis egregius* Cope, Ann. Rept. U. S. Geol. Surv. Terr. 1870, 438; Cope & Yarrow, Wheeler's Expl. W. 100th Mer. v, 662, 1877; not *Tigoma egregia* Girard.)

Numerous specimens of this species were obtained at Evanston, Wyo., of boys fishing with hook and line in tributaries of Bear River. It has not been observed in Utah Lake. As the original types of *Tigoma egregia*, examined by us, have 66 scales only in the lateral line, the species called *Tigoma egregia* by Professor Cope is distinct from it, and may receive the above specific name.

8. *Squalius atrarius* (Girard) J. & G.

This "club" is very abundant in Utah Lake. It is exceedingly destructive to the young trout, well meriting the epithet of "devilish club" applied to it by Mr. Madsen.

9. *Squalius rhomaleus*, sp. nov.

Allied to *Squalius niger* (Cope), but with the large scales of *Squalius squamatus* (Gill).

Body robust, elevated anteriorly, somewhat compressed or flat-sided, although the back is very broad. Head broad, considerably concave in profile as seen from the side, as in the groups called *Platygobio* and *Gila*; the interocular space flattish, scarcely raised above the level of the upper edge of the eye. Snout rather broad, somewhat elevated at tip; the premaxillary on the level of the pupil; the form of the head resembling that of *Chasmistes*. Mouth very oblique, its cleft at an angle of about  $45^{\circ}$ ; the mandible much projecting. Maxillary extending to the

front of the eye. Eye small, anteriorly placed, its diameter  $1\frac{3}{4}$  in snout, 7 times in the length of the head. Isthmus very narrow, the gill-openings extending forward below. Teeth 2, 5-4, 2; one of the teeth in the larger series with a broad, flattish, grinding surface, the others convex; the teeth comparatively short and stout. Scales large for the genus, subequal over the body, rather smaller on the belly, their texture firm, their exposed surfaces very broad and hexagonal. Dorsal fin inserted directly over the ventrals, behind the middle of the body. Caudal fin evenly forked, on a stout, rather long caudal peduncle, the rudimentary rays at its base not more than usually developed. Pectorals not long, extending three-fifths the distance to the ventrals; the ventrals about to the vent; the lower fins all short. Fin-rays: Dorsal 9; anal 8. Scales 10-55-5. Length of head contained  $3\frac{1}{2}$  times in the total length to the base of caudal; the greatest depth of the body about the same.

Color blackish, fins all dusky. The ground shade is somewhat silvery, but the color is rendered very dark by the large number of small black specks.

The typical specimens, two in number, are about a foot in length. This is therefore one of the largest members of the genus.

#### 10. *Apocope vulnerata* Cope.

Numerous specimens, some of them 5 inches in length. The large specimens have the lateral line developed anteriorly only. Pectoral fins short, not reaching nearly to ventrals. Lat. l. about 70.

#### 11. *Chasmistes liorus* Jordan.—*June Sucker*.

A considerable number of fine specimens of this interesting species are in the collection, all of them about 18 inches in length. Color olivaceous above, with dusky mottlings formed of dark points; belly white; fins chiefly pale, shaded at the tips with dusky. Anal and lower lobe of caudal tuberculate in the males. Body slender, heavy at the shoulders, somewhat compressed, the caudal peduncle stoutish; depth of body at the shoulders half more than its thickness. Head not conic, low at the nape, and strongly concave in profile above, from the great prominence of the premaxillary spines, which form a conspicuous nose, elevated above the eye, and with its top even with the interorbital space, which is very broad and nearly flat. Preorbital large; suborbital moderate. Mouth large and very oblique, anteriorly on the level of the suborbital bones; the mandible strong, placed at an angle of  $45^{\circ}$ , its base below the nostrils, its length equal to that of the snout, which is about three-sevenths that of the head. Upper lip somewhat protractile, narrow, vertical, its edge smooth; lower lip narrow, the two lobes well separated, very faintly plicate, the plicæ slightly uneven. No cartilaginous sheath to the jaws. Interorbital space nearly equal to length of snout. Eye small, exactly median, 7 in head. Isthmus as broad as eye. Pharyngeal teeth essentially as in *Catostomus*. Scales much reduced in size and crowded anteriorly, those on the breast imbedded in the skin. Scales



7-61-9; 28 series in front of the dorsal. Insertion of dorsal nearly midway between snout and base of caudal, the fin elevated in front, the anterior ray twice the height of the posterior, and about equal to the base of the fin; the free margin of the fin nearly straight. Caudal fin deeply forked, the lower lobe the longer. Lower fins all small. Dorsal rays 11; anal 7.

**12. *Catostomus fecundus* Cope & Yarrow.—Utah Sucker.**

This species occurs in Utah Lake in numbers which are simply enormous, justifying Mr. Madsen's assertion that the lake is the "greatest sucker pond in the universe". It is very destructive to the trout. It ascends the rivers in the spring to spawn at the same time as the latter species, on the eggs of which it feeds. In the interest of the food supply of Salt Lake City an organized attempt at the reduction or extirpation of this species may become necessary. The old trout feed largely on the young of this species, but the "suckers eat the trout first". No full description of *Catostomus fecundus* has been yet published. It will be seen from the following account that it is well separated from all its congeners, and that in many respects it approaches *Chasmistes liorus*. It is, in fact, probably the parent stock of the genus *Chasmistes*.

Body moderately stout, a little elevated, not much compressed, tapering into a long and slender caudal peduncle. Head subconic, the profile regularly decurved from the nape to the base of the premaxillary spines, which abruptly protrude, forming a distinct "nose", as in *Chasmistes liorus*. Preorbital long. Premaxillary a little below the level of the preorbital. Mandible large, oblique, placed at an angle of 30° when the mouth is closed; its length about one-third that of the head. Upper lip protractile, full, pendant, with about four rows of coarse papillæ. Lower lip moderately developed, divided nearly into two parts by a broad emargination, each lobe with about six rows of coarse papillæ. Mouth not large. Interorbital space strongly convex, its width nearly equal to length of snout. Eye a little behind the middle of the head, its diameter contained 7 times in the length of the head. Isthmus broader than eye. Scales 8-60-8, reduced in size forward; breast scaly.

Insertion of dorsal about midway between snout and base of caudal; the first ray nearly twice the height of the last, its length greater than that of the base of the fin. Caudal fin moderately forked, the lower lobe longest and widest. Pectorals long, reaching more than half way to ventrals, the latter not to vent. Anal high. Fin-rays: Dorsal 11; anal 7; ventrals 9. Length of head contained 4 times in total length to base of caudal; greatest depth 4½ times. Color blackish above, silvery below, the fins slightly dusky tinged, the dark colors formed of black points.

This species seems to reach a smaller size than the other lake suckers.

13. *Catostomus ardens*, sp. nov.

(? *Catostomus guzmaniensis* Cope & Yarrow; not of Girard.)

A large, thick-lipped species, allied to *C. macrochilus*, &c.

Body rather elongate, subfusiform, little compressed, the back broad and somewhat elevated. Head conical, broad and convex above, the front regularly sloping from the nape to the snout. Mouth entirely inferior, the mandible quite horizontal, the premaxillaries scarcely raised above the level of the base of the mandible. Upper lip very wide, full, pendant, with about eight rows of coarse, irregular papillæ, of which the second and third rows from the inside are much larger than the others; upper lip continuous with the lower at the angle of the mouth. the lower lip cut to the base in the middle by a deep, abrupt incision. Front of eye midway in head. Eye very small, 7 in head,  $3\frac{1}{2}$  in the convex interorbital space. Isthmus broad, half broader than the eye. Fontanelle large, as in the other species noticed in this paper. Scales crowded anteriorly, 9-65-9. Breast with evident imbedded scales. Dorsal fin inserted a little behind the middle of the body, long and low, its anterior rays but three-fourths the length of the base of the fin,  $1\frac{1}{2}$  the length of the last rays; the free edge of the fin straight. Caudal fin short and broad, about equally forked, its upper lobe two-thirds the length of the head. Pectorals short and broad, their length three-fourths that of the head. Ventrals short, not quite reaching vent. Anal very high, reaching caudal. Dorsal rays 13; anal 7. Length of head  $3\frac{3}{8}$  in body to base of caudal; greatest depth  $4\frac{1}{2}$ . Teeth essentially as in the others.

Color blackish above, blotched with darker, the whole back and sides obscurely spotted; belly white; a narrow, bright, rosy, lateral band on the anterior part of the body, overlying the blackish; fins mostly dusky mottled; top and sides of head rendered dusky by the presence of many dark specks.

This species is described from a large adult male nearly 18 inches in length, besides which we have a single young specimen.

There is another specimen in the collection, a large male fish 18 inches long, which agrees entirely with the type of *C. ardens*, with the following exceptions: The lower lip is wider, with less conspicuous, coarse, irregular papillæ, in 8 to 10 rows; the upper lip with two rows of large papillæ and several series of small ones. The caudal fin is much larger, the upper lobe three-fourths the length of the head, the lower broader than the upper; the pectoral fin is very long, but little shorter than head; and the ventrals reach the vent. The dorsal has 12 rays, and is long and low, as in *C. ardens*. The scales on the breast are almost obsolete. The isthmus shows a structure very different from that of any other Catostomoid fish known. The gill membranes are partly free posteriorly, their free margins forming a broad fold across the narrow isthmus, as in the genus *Cottus*. This structure appears normal, and is not the result of injury. If it be permanent, this form should probably constitute a distinct genus; if not, it may not be sepa-

rable as a species from *Catostomus ardens*. Meanwhile we abstain from giving a new name until more specimens can be obtained to settle the question.

INDIANA STATE UNIVERSITY, December 4, 1880.

**DESCRIPTION OF A NEW SPECIES OF "ROCK-FISH" (*SEBASTICHTHYS CHRYSOMELAS*), FROM THE COAST OF CALIFORNIA.**

**By DAVID S. JORDAN and CHARLES H. GILBERT.**

*Sebasticthys chrysomelas*, sp. nov.

(*Sebasticthys nebulosus* Jordan & Gilbert, Proc. U. S. Nat. Mus. iii, 1880, 73, and elsewhere; not *Sebastes nebulosus* Ayres.)

In previous papers on the California rock-fish we have provisionally identified one of the common species as the *Sebastes nebulosus* of Ayres. Ayres himself, however, considered his own *nebulosus* as without question the *Sebastes fasciatus* of Girard, which is the *Sebasticthys fasciolaris* of Lockington. The two species agree closely in general characters, but differ in the development of the spines on the head, and especially in color, the "*fasciolaris*" having the yellow markings in the form of small spots or specklings, which are confluent along the sides, forming a sort of band, the other species having the yellow areas all large. The original description of *Sebastes nebulosus* Ayres (Proc. Cal. Acad. Nat. Sci. i, 5, 1854) applies in the main to both species; but the account of the coloration applies to *S. fasciolaris* Lockington, and not to our "*S. nebulosus*".

Ayres says:

"In color this fish is finely mottled with dusky yellow and dark brown; on the fins the latter hue predominates, and the lighter mottlings have rather a bluish aspect."

We propose, therefore, to consider *fasciolaris* a synonym of *nebulosus*, and to give to the species previously called *nebulosus* by us the new name *chrysomelas*, in allusion to its yellow and black coloration.

**DESCRIPTION.**—Body short and stout, not much compressed; highest at the origin of the first dorsal, thence tapering rapidly to the tail. Head short, bluntish, the profile very steep. Mouth rather small, nearly horizontal, entirely below the axis of the body. Lower jaw rather shorter than the upper in the closed mouth; no prominent symphyseal knob. Premaxillaries anteriorly on the level of the lower edge of the orbit; maxillary reaching the vertical from the posterior margin of the pupil.

Preorbital wide, its neck about half the diameter of the eye, its margin sinuate, usually with a spine.

Ridges on top of head very prominent, high and strong, ending in strong spines, which diverge backward. They are a little stronger than in *S. carnatus*, but lower than in *S. nebulosus*. The following pairs are present: Nasal, preocular, supraocular, tympanic, and occipital, five in all. Preopercular spines short and thick, the uppermost usually the

longest. Opercular spines usual. A small spine on the interopercle and one on the subopercle at the junction of the two bones. Supra-scapular spines present. Gill-rakers short, rather thick, compressed and somewhat clavate, the longest about two-ninths the diameter of the orbit. Scales moderate, rough, the accessory ones few; about 56 transverse series. Lower jaw, maxillary, nasal region, and space in front of eye naked.

Dorsal spines high and strong, the third to sixth spines subequal and highest, rather higher than the highest soft rays. Dorsal fin deeply emarginate. Second anal spine much stronger than third, the two about equal in length. Pectorals with very broad base, reaching beyond the tips of the ventrals, which reach nearly to the vent. The lower pectoral rays thickened. Caudal slightly rounded.

D. XII, I, 13; A. III, 6.

Coloration black and yellow; the latter shade is usually a clear, warm, brownish yellow, with some specks of deeper orange. It varies from a dusky orange to olivaceous yellow, the latter color more often seen on the belly. The dark shades are black or dark brown, with slight olive tinge. The colors are usually purest in specimens taken in deep water.

The dark color predominates on the back; the membrane between the third and fourth dorsal spines and an area at the base of these spines is always pale; a yellow blotch extends thence downward and backward, joining the light color of the belly. Another light area passes from near the angle of the opercle around the pectorals, uniting below them. Three other blotches occur along the back, one under the eighth dorsal spine, one under the last spine, and one under the last soft ray; from each of these irregular pale areas extend down the sides. The fins have the color of the region to which they belong. Head above with dusky cross-shades and faint bands radiating from the eye.

This species reaches a length of about 15 inches, and is found in large numbers on the coast of California, from the island of San Nicolas, which marks the southern limit of the abundance of the "rock-fish", to Cape Mendocino. It is common in the markets of San Francisco, although not one of the most abundant species. Its affinity with *S. carnatus* has been elsewhere noticed (Proc. U. S. Nat. Mus. iii, 1880, 74).

A table of measurements will be found on page 75 of vol. iii.

The species described by us as *Sebastichthys vexillaris* in vol. iii, p. 292, is represented in Puget Sound and the Gulf of Georgia by a variety or subspecies with lower dorsal spines and much darker and duller coloration, the dark shades being of a reddish brown. The latter form is apparently identical with *Sebastes caurinus* Richardson, Ichth. Voy. Sulphur, i, 1844, 77, pl. 41, fig. 1, described from Sitka.

The species may therefore take the name of *Sebastichthys caurinus*, and the California form that of subspecies *vexillaris*.

INDIANA STATE UNIVERSITY,

Bloomington, Ind., November 6, 1880.



**FISHES FROM THE DEEP WATER ON THE SOUTH COAST OF NEW ENGLAND OBTAINED BY THE UNITED STATES FISH COMMISSION IN THE SUMMER OF 1880.**

**By G. BROWN GOODE.**

The following paper enumerates 51 species of fishes known to occur outside of the hundred-fathom curve along the southern coast of New England. Nearly all were obtained by the Fish Commission steamer "Fish Hawk" on its three trips to the "Lopholatilus Ground" in September. Several of the species were described a few weeks ago in another paper.

**MALTHEIDÆ.**

**1. *Halieutæa senticosa*, new species.**

A single small specimen (No. 26088) was obtained, September 13, from station 879, at a depth of 225 fathoms, and on October 2, from station 895, 238 fathoms, four specimens (No. 26175), ranging in length from 60<sup>mm</sup> to 140<sup>mm</sup>.

The occurrence on the Atlantic coast of the United States of a species of the genus *Halieutæa*, hitherto known only from China, is exceedingly interesting. A related genus, *Halieutichthys*, Poey, is represented in the West Indian fauna by the species *Halieutichthys aculeatus*.\*

**DESCRIPTION.**—Disk orbicular, nearly as wide as long; its length less than half that of the body; its lateral outlines prolonged on each side in a strong spine, armed at the tip with a group of irregularly arranged acicular spinelets. Body covered above with numerous stout, conical spines with stellular bases. These are largest upon the postdiscal portion of the body, where they are approximately arranged in about four irregular longitudinal rows upon each side of the dorsal fin. Closely set rows of these stout spines mark the outer margin of the disk, and there is also a cluster of five to seven upon each carpal peduncle. Outside of these marginal spines, upon each side, is an irregular marginal row of five depressed, knife-like spines, each tipped with a crown of three acicular spinelets. On the anterior margin of the disk the two rows of spines coalesce and form a bristling row of closely set spines, some pointing dorsally, some laterally, some ventrally. There are two kinds of spines upon the dorsal surface, in addition to the large ones already described: some large, somewhat remote from each other, conical, stellular; others, much more numerous and filling the interspaces, prickly-like, stellular. Belly armed with numerous closely set spines of a similar kind. Snout somewhat projecting, armed with three many-

\**Halieutichthys aculeatus* (Mitchill) Goode.

*Lophius aculeatus*, MITCHILL, Amer. Montbly Magazine, ii, 1818, p. 325 (specimen from Straits of Bahama).

*Halieutichthys aculeatus*, GOODE, Proc. U. S. Nat. Mus. ii, 1879, p. 109 (calling attention to Mitchill's description).—GOODE & BEAN, *ibid.* p. 333 (specimen from Key West).

*Halieutichthys reticulatus*, POEY, Proc. Acad. Nat. Sci. Phila. 1863, p. 91 (specimen from Cuba).



tipped spines. A spine-armed ridge in front of the eyes, over the top of the snout. In this four spines are conspicuous, one in front of each eye, and between these a larger pair, in front of the supraorbital ridges. From these last-mentioned spines extend spine-armed ridges along the upper margins of each orbit. Under the snout is a cavity containing a barbel, pedicelled, with thick, club-shaped, trilobate tip. On each side of this cavity are the nasal openings.

The width of the mouth is equal to the distance between the centers of the pupils of the eyes, this being much less than in *Halientea stellata*, in which the mouth is proportionally twice as large. The shape of the disk is less circular than in the Asiatic species, being intermediate between this form and *Halientichthys*. Other points by which *H. stellata* may be distinguished are the absence of the strong lateral spines of the disk; the slighter specialization of the carpal peduncles; the greater proportionate size of the disk, which occupies two-thirds of the entire length of the fish; the less immediately axillary position of the gill-openings; the less spiny armature of the body, the spines upon the margin being smaller and less crowded; and the entire absence of spines upon the ventral surface.

D. 6; A. 4; C. 8; P. 13-15; V. 5. Color reddish gray, whitish below.

*Measurements.*

Current number of specimen .....	26175.	
Locality .....	Station 895.	
	Milli- meters.	100ths of length.
Extreme length .....	140	.....
Length to base of middle caudal rays .....	118	100
Body:		
Greatest width of disk .....		50
Length of disk (snout to lateral spine) .....		47
Length of disk (snout to angle of pectoral) .....		47
Least height of tail .....		5
Length of body (outside of disk) .....		40
Head:		
Greatest length (to branchial opening) .....		39
Width of interorbital area .....		8
Length of snout .....		4
Width of mouth .....		16
Length of maxillary .....		9
Length of mandible .....		10
Diameter of orbit .....		8
Dorsal:		
Distance from snout .....		60
Length of base .....		8
Greatest height .....		14
Length of rostral barbel .....		2
Anal:		
Distance from snout .....		65
Length of base .....		5
Height at longest ray .....		14
Caudal:		
Length of middle rays .....		13
Pectoral:		
Distance of elbow from snout .....		52
Length .....		24
Ventral:		
Distance of free portion from snout .....		35
Length .....		12
Dorsal .....		6
Anal .....		4
Caudal .....		8
Pectoral .....		13-15
Ventral .....		5

## LOPHIIDÆ.

2. *Lophius piscatorius*, Linn.

A specimen, No. 26170, 26<sup>cm</sup> long, containing immature ova, was taken at station 894, at a depth of 365 fathoms; also a large specimen with immature ova, No. 26098, from station 876, 120 fathoms; and a smaller one, perhaps two years old, No. 26070, from station 878, 142½ fathoms.

3. *Mancalias uranoscopus* (Murray) Gill.

*Ceratias uranoscopus*, MURRAY, in Wyville Thompson, *The Atlantic*, 1878, ii, p. 67, fig. 20 (Am. ed.).

*Mancalias uranoscopus*, GILL, *Proc. U. S. Nat. Mus.* i, 1878 (Oct. 17), p. 228.

A single specimen, No. 26159, 185<sup>mm</sup> long, was taken October 2 at station No. 893, at a depth of 372 fathoms. It is of much interest, only one specimen having hitherto been found. This was dredged July 23, 1873, by H. M. S. Challenger, southeast of Madeira (lat. 22° 18' N., long. 22° 2' W.), at a depth of 2,300 fathoms (temperature 1° 65' C.). Mr. Murray's description, which is sufficiently accurate except that our specimen has four instead of three rays in the second dorsal, runs as follows: The specimen is 90<sup>mm</sup> in length from the snout to the end of the tail, compressed laterally, and of a uniform black color. The anterior spine of the first dorsal fin is produced into a long filament, ending in a pear-shaped bulb, terminating in a very distinct, semi-transparent, whitish spot. This spine has its origin on the posterior portion of the head, and when laid back it reaches nearly to the tip of the tail. The second part of the first dorsal is placed far back on the body, and consists of two short, fleshy tubercles, which lie in a depression in front of the second dorsal fin. The second dorsal has three rays; the anal is opposite the second dorsal and has four rays; the caudal has eight rays, the four central rays being much larger than the others, and bifid. The pectorals are small and have ten very delicate rays. The gill-opening is a slit situated below the pectoral fin. The upper jaw is formed by the intermaxillaries, and is armed, together with the lower jaw, with a series of teeth of moderate size, which can be depressed inward as in *Lophius*. The skin is thickly covered with minute, embedded, conical spines. The eyes are very small and are placed high up on the middle of the head. The presence of a fish of this group at so great a depth is of special interest. From its structure, and from the analogy of its nearest allies, there seems to be no reasonable doubt that it lives on the bottom. It is the habit of many of the family to lie hidden in the mud, with the long dorsal filament and its terminal soft expansion exposed. It has been imagined that the expansion is used as a bait to allure its prey, but it seems more likely that it is a sense-organ intended to give notice of their approach.

## ANTENNARIIDÆ.

4. *Chaunax pictus*, Lowe.

*Chaunax pictus*, LOWE, Trans. Zool. Soc. Lond. iii, 1846, p. 339, pl. li.—GÜNTHER, Cat. Fish. Brit. Mus. iii, 1861, p. 200.—GILL, Proc. Acad. Nat. Sci. Phila. 1863, p. 90 (generic diagnosis in synopsis of family); Bull. U. S. Nat. Mus. i, 1878, p. 222.

A single small specimen of a species of *Chaunax*, 37<sup>mm</sup> long, was obtained September 4, at station 869, at a depth of 192 fathoms.

While there is a general agreement between the specimen described from Madeira by Lowe under the name *Chaunax pictus*\* and the immature individual of the same genus before me, there are certain characters, such as the slightly smaller number of fin-rays in dorsal and caudal, and the difference in the shape of these fins in the latter, which renders the question of their identity somewhat doubtful. I am unwilling, however, to establish a new specific name on this immature specimen, particularly since the shape of the fins is likely to be modified with age, and the difference in the radial formula is hardly of specific importance. The specimen is therefore provisionally referred to Lowe's species. A larger specimen from our coast is much to be wished for. Lowe's was 406<sup>mm</sup> (16 inches) long, and "was taken with an ordinary bait and line at the Picos, a rocky shoal about a league from the shore of Camera de Lobos, a village five or six miles to the westward of Funchal, on the 12th of March, 1846"; depth of water not stated. The color of this specimen was bright orange above, rosy at the sides, and with fins and tips vermilion; on the belly rosy white, with fins vermilion.

The color of our specimen, No. 26021, is brownish gray. The rostral tentacle is nearly as long as the diameter of the eye.

Radial formula: D. I, 10; A. 5; C. 7; V. [3]; P. 10.

*Measurements.*

	Milli- meters.	100ths of length.
Extreme length .....	37	.....
Length to base of middle caudal rays .....	27	100
Body:		
Greatest height .....		18
Greatest width .....		12
Least height of tail .....		4
Head:		
Greatest length (to branchial aperture) .....		74
Greatest width .....		33
Width of interorbital area .....		15
Length of snout .....		11
Length of maxillary .....		20
Length of mandible .....		18
Diameter of orbit .....		5
Dorsal tentacle .....		4
Dorsal fin:		
Distance from snout .....		70
Anal:		
Distance from snout .....		74

\* 1846.—LOWE, Rev. R. T. On a New Genus of the Family *Lophidae* (Les Pectorales, Pediculæ, Cuv.), discovered in Madeira. < Trans. Zool. Soc. London, iii, pp. 339 344, pl. li. Read Sept. 22, 1846.

## Measurements—Continued.

	Milli- meters.	100ths of length.
Caudal:		
Length of middle rays .....		28
Pectoral:		
Distance from snout .....		64
Length .....		[10]
Ventral:		
Distance from snout .....		44
Length .....		[10]
Dorsal .....		I, 10
Anal .....		5
Caudal .....		7
Pectoral .....		10
Ventral .....		[3]

## PLEURONECTIDÆ.

5. *Hippoglossus vulgaris*, Fleming.

*Pleuronectes hippoglossus*, LINN. Syst. Nat. ed. x, i, p. 269

*Hippoglossus vulgaris*, FLEMING, Brit. Animals, p. 199.—GÜNTHER, Cat. Fish.

Brit. Mus. iv, 1862, p. 403.

*Hippoglossus americanus*, GILL, Proc. Acad. Nat. Sci. Phila. 1864, p. 220.

The New London halibut-smacks obtain many halibut on the south part of George's Banks and the neighboring shoals. An individual was taken, years ago, on the outer side of Fisher's Island, Connecticut. The halibut may, in all probability, be found to be abundant on the edge of the continental slope south of Cape Cod, since here have been recently obtained nearly all the species most constantly associated on the northern halibut grounds on the outer edges of La Have, Brown's, Sable Island, and other banks off the coast of Nova Scotia and Newfoundland.

6. *Hippoglossoides platessoides* (Fabricius) Gill.

*Pleuronectes platessoides*, FABRICIUS, Fauna Groenlandica, 1780, p. 164 (excellent description).—"Vidensk. Selsk. Naturv. och Mathem. Afhandl. i, p. 50, pl. ii, fig. 2."

*Citharus platessoides*, REINHARDT, *ibid.* vii, 1838, p. 130.—KRÖYER, in Gaimard, Voyages en Scandinavie, etc. pls. xxi (excellent figure).

*Drepano(p)setta platessoides*, GILL, Cat. Fish. E. Coast N. America, 1861, p. 50.

*Hippoglossoides platessoides*, GILL, Proc. Acad. Nat. Sci. Phila. 1864, p. 217.—GOODE & BEAN, Cat. Fish. Essex Inst. 1879, p. 7.

*Platessa dentata* (not *Pleuronectes dentatus*, Mitchill). STORER, Rep. Fish. Mass. 1839, p. 143; Hist. Fish. Mass. 1867, p. 197, pl. xxx, fig. 3.

*Hippoglossoides dentatus*, GILL, Cat. Fish. E. Coast N. A. 1861, p. 50.—GÜNTHER, Cat. Fish. Brit. Mus. iv, 1862, p. 405.

*Pomatopsetta dentata*, GILL, Proc. Acad. Nat. Sci. 1864, p. 217 (with def. of *Pomatopsetta*, p. 216).

*Hippoglossoides limandoides*, GOODE & BEAN, Amer. Journ. Sci. & Arts, xvii, 1876, p. 39.

Not unusual in deep water off Southern Massachusetts and Rhode Island, approaching the coasts in winter, but not taken in these trips of the Fish Commission steamer.

**7. *Paralichthys oblongus*, (Mitchill) Jordan.***Pleuronectes oblonga*, MITCHILL, Trans. Lit. & Phil. Soc. N. Y. i, 1814, p. 391.*Platessa oblonga*, STORER, Syn. Fish. N. A. p. 225.—DEKAY, Zool. N. Y. Fish. 1842, p. 299, pl. xlviii, fig. 156.*Chenopsetta oblonga*, GILL, Cat. Fish. E. Coast N. A. 1861, p. 50 (name of genus proposed; no definition); Proc. Acad. Nat. Sci. Phila. 1864, p. 218 218 (genus defined p. 216).*Pseudorhombus oblongus*, GÜNTHER, Cat. Fish. Brit. Mus. iv, 1864, p. 423.—

GOODE &amp; BEAN, Cat. Fish. Essex Co. &amp; Mass. Bay, 1879, p. 7.

*Paralichthys oblongus*, JORDAN, MSS.*Platessa quadrocellata*, STORER, Proc. Bost. Soc. Nat. Hist. ii, 1847, p. 242; Hist. Fish. Mass. 1867, p. 203, pl. xxxi, fig. 3.*Platessa quadroocularis*, GILL, Cat. Fish. E. Coast N. A. 1861, p. 51.

Specimens were obtained at the following trawling stations: No. 26078, from station 873, 100 fathoms.

**8. *Monolene sessilicauda*, Goode.***Monolene sessilicauda*, GOODE, Proc. U. S. Nat. Mus. iii, 1880, p. 338.

Specimens were obtained from the following stations:

	Fathoms.
No. 26004, stations 870, 871.....	150-115
No. 26099, station 876.....	120
No. 26109, station 877.....	126

**9. *Citharichthys arctifrons*, Goode.***Citharichthys arctifrons*, GOODE, Proc. U. S. Nat. Mus. iii, 1880, p. 341.

Specimens were obtained from the following stations:

	Fathoms.
Nos. 25908, 26130, station 871.....	115
Nos. 26100, 26101, station 872.....	86
No. 26117, station 876.....	120
No. 26118, station 876.....	120
No. 26124, station 878.....	142½
No. 26129, station 874.....	85
“ station 870.....	155

**10. *Citharichthys unicornis*, Goode.***Citharichthys unicornis*, GOODE, Proc. U. S. Nat. Mus. iii, 1880, p. 342.

Specimens were obtained as follows:

	Fathoms.
No. 26003, station 870.....	155
No. 26003, station 871.....	155

**11. *Limanda ferruginea* (Storer) Goode & Bean.***Platessa ferruginea*, STORER, Hist. Fish. Mass. 1867, p. 198, pl. xxx, fig. 4.*Myxopsetta ferruginea*, GILL, Cat. Fish. E. Coast N. A. 1861, p. 51 (genus not defined); Proc. Acad. Nat. Sci. Phila. 1864, p. 217 (genus defined), *et alibi*.*Pleuronectes ferrugineus*, GÜNTHER, Cat. Fish. Brit. Mus. iv, 1862, p. 447.*Limanda ferruginea*, GOODE & BEAN, List Fish. Essex Co. & Mass. Bay, 1879, p. 6.*Platessa rostrata*, H. R. STORER, Boston Journ. Nat. Hist. v, 1857, p. 268, pl. viii, fig. 2.*Myxopsetta rostrata*, GILL, ll. c.

Numerous specimens were taken in 1874, 1875, and 1880 south of Cape Cod, in deep, cold water. The most southern locality is the *Pecten* Ground off Watch Hill.



12. *Limanda Beanii*, new species.

Two specimens, No. 26102, were obtained—one from station 875, at a depth of 126 fathoms; one from station 876, 120 fathoms—which are provisionally referred to the genus *Limanda*, Gottsche, as understood by American ichthyologists. The species surely belongs to *Pleuronectes*, as limited by Günther, the weight of whose opinion regarding the difficulties of making generic divisions in this group is fully appreciated. The extreme brevity of the snout and the elongate-elliptical form of the body render its shape very unlike that of *Limanda ferruginea* of our own coast and *Limanda platessoides* of the Eastern Atlantic. In its general appearance, except that the ventrals are not both lateral, it resembles considerably the species mentioned above.

DESCRIPTION.—The body is elliptical in form, with angular outlines. Its height is three-eighths (38) of its total length, and slightly more than twice the length of the head, and about three times the greatest height of the anal fin. Its height at the ventrals (25) is one-fourth of its length and less than distance from snout to origin of anal. Its least height, at base of tail (12), is half its height at ventrals. It is thin, its greatest width (7) not exceeding the diameter of the orbit.

The scales are subcircular, small, strongly pectinate on the colored side, cycloid on the blind side, where they are also larger, there being about fifty (as nearly as can be counted in the specimens before me) in the lateral line, behind the curve, while on the colored side there are probably sixty. The lateral line on the colored side makes a very abrupt, conspicuous, angular, high curve over the pectoral fin. The chord of this arc is nearly as long as the head of the fish, its height half as great. The scales in the lateral line are highly specialized, particularly along the curve, which appears to contain about twenty-seven of them, while posterior to this, in the straight portion, there are about sixty. The specialized scales of the lateral line extend far out upon the caudal fin. On the blind side the lateral line is little conspicuous, the scales very slightly specialized, and it becomes obsolete in the region where, upon the colored side, the curve is located. The scales extend far out upon the caudal fin, but are not present upon the other fins.

The head is very short, its length (18) contained about five times and one-half in the total. The snout is very short (2), one-fiftieth of the total, and the mouth is small, its cleft subvertical, and the maxillary extending very slightly behind the anterior margin of the orbit. The teeth are inconspicuous, apparently in two rows, stronger and more numerous on the blind side, barely discernable in upper jaw, absent elsewhere in the mouth.

The eyes are large, prominent; their diameters (7) greater than the length of the maxillary (6) and equal to that of the mandible (6). They are very closely set, the interorbital space marked by a knife-like edge of bone. The upper eye, in its outline trenching upon the dorsal outline of the head, is almost directly above its mate. Together they occupy

nearly three-fourths of the width of the head at the perpendicular passing through their centers.

The dorsal fin begins over the posterior part of the pupil of the upper eye. Its rays are long, widely separated, and with their tips protruding beyond the membrane, giving to this, as also to the anal, a ragged, irregular appearance. Its greatest height (8) is equal to half the length of the head. The anal is inserted under the axil of the pectoral, and its height is about the same as that of the dorsal.

The length of the caudal (20) is equal to one-fifth of that of the body, without including caudal. It is broad, fan-shaped, acutely convex in outline. The distance of the ventral from the snout (28) is about one-third the length of the base of the dorsal. The arrangement of these fins upon the ventral keel is much as in *Limanda ferruginea*, the right fin being almost upon the median line. The pectorals are normal.

The color is grayish brown, mottled with darker patches. There is a conspicuous black blotch upon the outer rays of the caudal on either side.

Radial formula: D. 64; A. 63; C. 18; P. 7; V. 6; lateral line about 88.

This species is dedicated to my associate Dr. Tarleton H. Bean, of the United States National Museum.

*Measurements.*

Current number of specimen.....	26102.	
Locality.....	Stations 875-6.	
	Milli- meters.	100ths of length.
Extreme length.....	135	
Length to base of middle caudal rays.....	111	100
Body:		
Greatest height.....		38
Greatest width.....		7
Height at ventrals.....		25
Least height of tail.....		12
Head:		
Greatest length.....		18
Width of interorbital area.....		5
Length of snout.....		2
Postorbital portion of head.....		9
Length of maxillary.....		6
Length of mandible.....		7
Diameter of orbit.....		7
Dorsal:		
Distance from snout.....		9
Length of base.....		83
Greatest height.....		8
Anal:		
Distance from snout.....		28
Length of base.....		70
Caudal:		
Length of middle rays.....		20
Pectoral:		
Distance from snout.....		17
Length.....		9
Ventral:		
Distance from snout.....		17
Length.....		9
Dorsal.....		64
Anal.....		63
Caudal.....		18
Pectoral.....		7
Ventral.....		6 R.
Number of scales in lateral line ( <i>ca.</i> ).....	88 (27 in curve).	

**13. Glyptocephalus cynoglossus** (Linn.) Gill.

*Pleuronectes cynoglossus*, LINNÆUS, Syst. Nat. ed. x, i, 1758, p. 269.

*Glyptocephalus cynoglossus*, GILL, Proc. Acad. Nat. Sci. Phila. 1873, p. 161.—

GOODE & BEAN, Proc. U. S. Nat. Mus. i, 1878, p. 21 (with extensive synonymy).

Numerous specimens of various sizes, from the young of two centimeters to the adult of fifty centimeters, were taken in the following localities:

**14. Thyris pellucidus**, Goode.

*Thyris pellucidus*, GOODE, Proc. U. S. Nat. Mus. iii, 1880, p. 344.

Specimens were obtained from the following localities:

	Fathoms.
No. 26005, station 871 .....	115
No. 26006, station 872 .....	86

MACRURIDÆ.

**15. Macrurus Fabricii**, Sundeval.

*Macrurus Fabricii*, SUNDEVAL, "Vet. Akad. Handl. 1840, p. 6".—GOODE & BEAN, Cat. Fish. Essex Co. & Mass. Bay, 1879, p. 7.

*Macrurus rupestris*, GÜNTHER, Cat. Fish. Brit. Mus. iv, 1862, p. 390.

There can be little doubt that this species occurs south of Cape Cod, though no living specimens have yet been obtained. The first specimen found on the coast of the United States was picked up at sea, floating, somewhere off Gravesend, N. Y.

**16. Macrurus Bairdii**, Goode & Bean.

*Macrurus Bairdii*, GOODE & BEAN, Amer. Journ. Sci. & Arts, xiv, 1877, pp. 471-473 (Massachusetts Bay); Cat. Fish. Essex Co. & Mass. Bay, 1879, p. 7.

Specimens were obtained from the following localities:

	Fathoms.
No. 26062, stations 879-880 .....	225-252
Nos. 26163, 26166, 26187, 26194, station 893 .....	372
Nos. 26168, 26194, 26217, 26218, station 894 .....	365
Nos. 26191, 26195, 26210, station 895 .....	238
No. 26193, station 892 .....	487
Nos. 26212, 26217, 26218, station 891 .....	487

**17. Macrurus carminatus**, Goode.

*Macrurus carminatus*, GOODE, Proc. U. S. Nat. Mus. iii, 1880, p. 346.

Specimens were obtained from the following localities:

	Fathoms.
No. 26001, station 871 .....	115

GADIDÆ.

**18. Gadus morrhua**, Linnaeus.

The cod occurs in deep water on this portion of the coast.

**19. Phycis chuss**.

Several specimens apparently of this species were obtained outside of the hundred-fathom curve.

**20. *Phycis Chesteri*, Goode & Bean.**

*Phycis Chesteri*, GOODE & BEAN, Proc. U. S. Nat. Mus. i, 1878, p. 256; Cat. Fish. Essex Co. & Mass. Bay, 1879, p. 8.

Numerous specimens, old and young, were found at stations 878, 142 fathoms; 879, 225 fathoms; 880, 252 fathoms; 881, 325 fathoms; 892, 487 fathoms; 895, 238 fathoms.

This species and *Macrurus Bairdii* appear to be the most abundant fishes of this district, occurring in immense numbers and breeding copiously.

**21. *Phycis regius* (Walbaum) Jordan & Gilbert.**

*Blennius regius*, WALBAUM, Artedi, 1792, p. 186.

*Urophycis regius*, GILL, Proc. Acad. Nat. Sci. Phila. 1863, p. 240.

*Phycis regius*, JORDAN & GILBERT, Proc. U. S. Nat. Mus. i, 1878, p. 371.—GOODE & BEAN, Cat. Fish. Essex Co. & Mass. Bay, 1879, p. 8.—BEAN, Proc. U. S. Nat. Mus. iii, 1880, p. 70.

*Euchelyopus regalis*, SCHNEIDER, Bloch. Syst. Ichth. i (cloth), 1801, p. 33.

*Phycis regalis*, KAUP, Archiv für Naturg. 1858, p. 89.—GILL, Cat. Fish. E. Coast N. A. 1861, p. 49.—GÜNTHER, Cat. Fish. Brit. Mus. iv, 1862, p. 354.

"*Gadus blennioides*, MITCHILL, Medical Register, 1814."

*Gadus punctatus*, MITCHILL, *ibid.*

*Phycis punctatus*, DEKAY, Zool. N. Y. Fish. 1842, p. 292, pl. xlvi, fig. 149.

A specimen was obtained at station 870, in 155 fathoms of water. The distribution of this species is very puzzling. It has been found at Halifax, Nova Scotia, and south to the Cape Fear River, but seems nowhere abundant except about Long Island.

**22. *Haloporphyrus viola* Goode & Bean.**

*Haloporphyrus viola*, GOODE & BEAN, Proc. U. S. Nat. Mus. i, 1878, p. 257; Cat. Fish. Essex Co. & Mass. Bay, 1879, p. 8.

Specimens were taken October 2, at station 893, in 372 fathoms of water. The species has never before been found except on the outer edges of the Nova Scotia banks.

**23. *Enchelyopus cimbricus* (Linn.) Jordan.**

*Gadus cimbricus*, LINNÆUS, Syst. Nat. ed. x, i.

*Onos cimbricus*, GOODE & BEAN, Proc. U. S. Nat. Mus. i, 1878, p. 349 (with full synonymy); Cat. Fish. Essex Co. & Mass. Bay, 1879, p. 8.

*Enchelyopus cimbricus*, JORDAN, MSS.

Several specimens were obtained outside the hundred-fathom curve.

**24. *Merlucius bilinearis* (Mitchill) Gill.**

Numerous specimens of old and young were taken September 4, September 13, and October 2, in almost every haul of the trawl-nets, at whatever depth. The adults appeared to be in the middle of the spawning season, the eggs being separated in the ovaries and flowing easily in specimens taken at the depth of 250 and 487 fathoms. This phenomenon is of the greatest interest and importance, since it may serve to illustrate how other species, common near the shores, such as the menhaden (*Brevoortia tyrannus*) and the bluefish (*Pomatomus saltatrix*), retreat to deep water to spawn.



25. *Hypsicometes gobioides*, Goode.

*Hypsicometes gobioides*, GOODE, Proc. U. S. Nat. Mus. iii, 1880, p. 348.

A single specimen of this puzzling little stranger was obtained at station 871, in 115 fathoms of water.

STICHÆIDÆ.

26. *Eumesogrammus subbifurcatus* (Storer) Gill.

A single specimen of this arctic species was obtained off the mouths of Newport Harbor.

LYCODIDÆ.

27. *Lycodes Verrillii*, Goode & Bean.

*Lycodes Verrillii*, GOODE & BEAN, Amer. Journ. Sci. & Arts, xvi, 1877, p. 474; Cat. Fish. Essex Co. & Mass. Bay, 1879, p. 9.

Specimens were obtained at the following localities: Stations 870, 155 fathoms; 879, 225 fathoms; 880, 252½ fathoms; 881, 325 fathoms; 893, 372 fathoms; 895, 238 fathoms; often in considerable abundance.

28. *Lycodes paxillus*, Goode & Bean.

*Lycodes paxillus*, GOODE & BEAN, Proc. U. S. Nat. Mus. ii, 1879, p. 44; Cat. Fish. Essex Co. & Mass. Bay, 1879, p. 9.

Two specimens, No. 26181, came from stations 891 and 894, 487 and 365 fathoms. The unique specimen previously known was obtained by Captain Collins in the gully between La Have and Sable Island Banks. The enormous development of the buccal muscles appears to be a character acquired in old age, as also the special peculiarities of dentition mentioned in the description.

ANARRHICADIDÆ.

29. *Anarrhichas lupus*, Linnaeus.

A single small specimen, about 30<sup>mm</sup> in length, was obtained at station 866, in 65 fathoms. At the time of writing the present notice this is not available for examination, but it is believed to be the young of *Anarrhichas lupus*, never before recorded south of Cape Cod.

LIPARIDIDÆ.

30. *Liparis* sp.

Specimens of a *Liparis* closely resembling *L. ranula*, Goode & Bean, were obtained at station 879, and are preserved for future discussion.

COTTIDÆ.

31. *Amitra liparina*, new genus and new species (*Cottilar*).

Two specimens of the fish here described were obtained, October 2, at station 891, in 487 fathoms; one, No. 26184, 164<sup>mm</sup> long; also a smaller one, 55<sup>mm</sup>. Their structure was so peculiar that I have long hesitated to describe them. They are evidently Liparoid fishes, without ventral fins or ventral disk. Professor Jordan and Dr. Bean have examined



them with me, and the decision has been reached that they should be placed in a new genus of the family *Cottidae*. Professor Jordan considers this genus as forming one of the most abnormal types of *Cottidae*, approached through *Cottunculus* and *Psychrolutes*, and also closely allied to *Liparide*.

AMITRA, new genus.

Cottoid fishes, with small head, elongate, attenuate, body covered with thick, lax, slimy skin. Ventral fins absent. Opercular stray present. Pseudobranchiae present. Gills  $3\frac{1}{2}$ , without slit behind last (?). Gill-openings closed below, restricted to small slits under the very small operculum. Operculum very small, strap-shaped. Lower jaw included within the upper. Teeth weak, paved. First five rays of the dorsal non-articulate, the others grading gradually into the flexible rings.

32. *Amitra liparina*, new species.

DESCRIPTION.—Body elongate, compressed posteriorly, very thin at the tail, covered with a gelatinous, lax, transparent skin, which is separated from the body and the fins by a filmy, mucous intertissue. Greatest height of body (18) contained five and one-half times in its length, without caudal.

Head thick, convex between eyes, its greatest width (11) nearly three-fourths its length (15), which is contained six and two-third times in the length of the body. Snout convex, protruding. Mouth under the snout and far back from its tip. Eyes lateral, in diameter (3) about half the width of the interorbital area (5). Nostril in front of eye. Pores along the upper lip. When the head is viewed from directly in front the opening of the mouth seems to be convex upward.

The dorsal fin begins over the end of the pectoral, and the rays and outline of this, as well as of the anal, are hardly visible through the thick, lax skin. The rays are thick, but very flexible. The anal begins under the eighth to tenth dorsal ray. The dorsal and anal rays lie closely connected with those of the caudal, which are somewhat larger, and extend in a pencil-like point.

The pectoral is broad, its lower base almost under the posterior margin of the orbit. It is composed of twenty-three rays, the six lowest of which are prolonged beyond the lower rays contiguous. The jugular disk cannot be found.

Radial formula: D. 67; A. 54; C. 6; P. 23.

Color: Yellowish white, dusky toward the tail and blackish upon the anterior part of the head. Abdominal cavity showing black through the skin.

Two other specimens of this or a related species were obtained (No. 26179) from station 894, in 365 fathoms of water, but they are in poor condition and cannot at present be made out.

## Measurements.

Current number of specimen Locality	26184. Station 487.	
	Milli- meters.	100ths of length.
Extreme length	164	.....
Length to base of middle caudal rays	150	100
Body:		
Greatest height		18
Greatest width		9
Head:		
Greatest length		15
Greatest width		11
Width of interorbital area		5
Length of snout		4
Diameter of orbit		3
Dorsal:		
Distance from snout		30
Greatest height		6
Anal:		
Distance from snout		37
Height at longest ray		5
Caudal:		
Length of middle rays		9
Pectoral:		
Distance from snout (below)		8
Length		10
Dorsal		67
Anal		54
Caudal		6
Pectoral		23

33. *Cottunculus microps*, Collett.

*Cottunculus microps*, COLLETT, Tillhægsh. til. Vidensk.-Selsk. Forh. Christiania, 1864, p. 20, pl. i, figs. 1-3; Norges Fiske, 1875, p. 20, pl. i, figs. 1-3; Fiske Nordhaus-Expeditionen, 1878, p. 20; Meddelelser om Norges-Fiske Aarena, 1875-78, 1879, p. 11.

Specimens from the following localities have been obtained:

	Fathoms.
No. 26087 (1), station 880	252½
No. 26167 (3), station 892	372
station 894	365
station 895	238
No. 26176 (3), station 895	238
No. 26140 (1), station 880	252½

The largest measures 265<sup>mm</sup>, the smallest 25<sup>mm</sup>. This species, never before found except on the Norwegian coast, was described from a specimen measuring 15<sup>mm</sup>, dredged by Prof. G. O. Sars at Hasvig, near Hammerfest, in 200 fathoms, August, 1874; another, 50<sup>mm</sup> long, near Trondhjemsfjord, in 1878, by Mr. Storm, at a depth of 180 fathoms; again, at a depth of 191 fathoms, 18 miles northwest from Hammerfest (72° 27' N., 20° 51' W.), in temperature 3° 5' C., and at a depth of 459 fathoms; 15 miles westward of Northwestern Spitzbergen (79° 59' N., 5° 40' W.), with temperature of 1° C.

34. *Cottunculus torvus*, new species, undescribed.

A smooth-skinned species of *Cottunculus* was also obtained. This is reserved for future discussion.

## AGONIDÆ.

35. *Peristedium miniatum*, Goode.

*Peristedium miniatum*, GOODE, Proc. U. S. Nat. Mus. iii, 1880, p. 349.

Specimens were obtained from the following localities:

	Fathoms.
No. 26023, station 869.....	192
No. 26030, station 871.....	115
No. 26083, station 876.....	120

As has already been stated, adults and young were found, the former full of nearly ripe eggs.

36. *Aspidophoroides monopterygius* (Bloch) Valenciennes.

In 1874 a head of an individual of this species was dredged up on the "Pecten Ground" off Watch Hill, R. I. This is the sole instance of its capture south of Cape Cod, though there can be little doubt that it is of frequent occurrence in the districts recently explored by the Commission.

37. *Sebastes marinus*, Linnaeus.

Numerous small individuals of this species were taken in nearly every haul of the trawl-net down to the depth of 155 fathoms.

38. *Setarches parmatus*, new species.

A single specimen, No. 28084, was obtained at locality 876, in 120 fathoms. The young fish, 52<sup>mm</sup> long, was taken in company with numerous young specimens of *Sebastes marinus*, from which it differs in many very striking respects.

It appears to belong to the type described by Johnson under the name *Setarches*.\*

It is, however, much stouter and higher than the other known species of this genus, *Setarches Güntheri*, from which, too, it differs in having 10 instead of 11 spines in the first dorsal, and 6 instead of 5 rays in the ventrals. The height of the body (38) is three-eighths of its standard length. The length of the head (45) is nine-twentieths of the same. The diameter of the eye (12) is contained less than four times in the length of the head (45). The scales are small, cycloid, each with several concentric furrows.

The specimen is so young, and mutilated withal, that it seems scarcely desirable to prepare an elaborate specific diagnosis. I append, however, a table of measurements, from which the other proportions of the body may readily be deduced, hoping soon to secure materials for a better description. *Setarches parmatus* may readily be distinguished from *Sebastes marinus* by its more generous proportions, as well as by the generic characters already mentioned. The height of the body is three-eighths of

\* Proc. Zool. Soc. London, 1862, p. 177; *Setarches Güntheri*, n. s. Madeira, p. 177, pl. xxiii.

its length instead of one-fourth; its width is one-fourth instead of three-twentieths; the length of the head nine-twentieths instead of three-eighths. The width of the interorbital area is half the length of the upper jaw instead of one-fourth, and is nearly equal to instead of one-half of the diameter of the orbit. The vertical fins are inserted farther back, the paired fins farther forward, and the fins are, without exception, longer. The tail appears to be truncate instead of emarginate, as in *S. marinus*. The preopercular spines are very prominent. The spinous dorsal contains ten spines.

Measurements.

Species: *Setarches parmatius*.

Current number of specimen .....	26084	
Locality .....	Station 876.	
	Milime- ters.	100ths of length.
Extreme length .....	52	---
Length to base of middle caudal rays .....	43	100
Body:		
Greatest height .....		38
Greatest width .....		23
Least height of tail .....		9
Head:		
Greatest length .....		45
Width of interorbital area .....		10
Length of snout .....		10
Length of operculum .....		13
Length of upper jaw .....		23
Diameter of orbit .....		12
Dorsal:		
Distance from snout .....		42
Length of base .....		34
Greatest height at fourth spine .....		23
Height at first spine .....		10
Height at second spine .....		18
Height at third spine .....		22
(Soft) length of base .....		Mutilated.
Anal:		
Distance from snout .....		80
Length of base .....		12
Height at first spine .....		7
Height at second spine .....		14
Height at third spine .....		11
Height at longest ray .....		15
Caudal:		
Length of middle rays .....		24
Pectoral:		
Distance from snout .....		44
Length .....		44
Ventral:		
Distance from snout .....		44
Length .....		25
Dorsal .....		X, 6+
Anal .....		III, 6

XIPHIIDÆ.

39. *Xiphias gladius*, Linn.

A fishing smack from Noank, Conn., was engaged by Professor Baird to set a trawl on the edge of the oceanic slope, in the hope of obtaining more specimens of *Lopholatilus*. Their only capture was a sword-fish thirteen feet long and weighing over 600 pounds. This was brought up from the bottom on the trawl-line. There is room for much question whether it was taken at the bottom or fastened itself to the

hooks as the line was being lowered, and was carried by its weight to the bottom. This curious freak of the sword fish, so often observed of late, deserves careful study.

### LATILIDÆ.

#### 40. *Lopholatilus chamæleonticeps*, Goode & Bean.

*Lopholatilus chamæleonticeps*, GOODE & BEAN, Proc. U. S. Nat. Mus. ii, 1879, p. 205.

In July, 1879, numerous specimens of this remarkable fish were taken by Gloucester fishing vessels, at a depth of 84 fathoms, 80 miles south by east from Noman's Land. The first trip of the "Fish Hawk" to deep water from Newport was September 4, and the nets were hauled as nearly as possible on the same grounds where *Lopholatilus* had previously been taken.

The second trip, ten days later, was to a region about forty miles farther west, and on this occasion six or more large individuals of this species were brought up on a hand line ("ladder-line") set from an open boat sent out from the steamer. None were at any time taken in the trawl-nets, though there is every reason to believe from the success of the fishing vessels previously, and from the number taken on the hand-line by the men in the small boat, that they are exceedingly abundant in this locality and probably for hundreds of miles in either direction, or at any rate to the south.

The *Lopholatilus* may yet prove to be a fish of economic importance. Its suitability for food was tested at the ward-room table of the "Fish Hawk", and it was pronounced equal to cod-fish, though somewhat finer grained in flesh.

The following notes upon color and internal structure were taken from a fresh specimen. The colors are very beautiful, and in general appearance when taken from the water it is one of the loveliest fishes I have ever seen, no exception being made in favor of the brilliant parrot-fishes or angel-fishes of the West Indian coral groves.

*Color*.—Black bluish, with a green tinge, iridescent, changing through purplish blue and bluish gray to rosy white below, and milky white toward the medium line of the belly. Head rosy, iridescent, with red tints most abundant on the forehead, blue under the eyes cheeks fawn-colored. Throat and under side of the head pearly white; with an occasional tint of lemon-yellow; this is most pronounced in front of the ventrals and on the anterior portion of ventral fins. Back with numerous maculations of bright lemon or golden. Anal purplish, with blue and rose tints, iridescent. Margin of anal rich purplish blue, iridescent like the most beautiful mother of pearl. This color prevailing more or less the whole fin, which has large yellow maculations. The lower border is rose-colored like the belly, and the base of the fin also partakes of this general hue. Dashes of milk-white on the base of the anal between the rays.



Dorsal gray. In front of the seventh dorsal the upper third posterior to the upper two-thirds dark brown. Spots of yellow, large, elongate, on or near the rays. Adipose fin whitish brown or yellow; a large group of bright yellow, confluent spots at the base.

Pectorals sepia colored with rosy and purplish iridescence.

*Viscera*.—Stomach small, siphonal, barely more than a loop in the very large intestine. Alimentary canal short, stomach and intestine when stretched out at full length extending from the diaphragm to the caudal. A loop in the intestine immediately posterior to the stomach. Liver with two lobes, nearly equal in length, light chestnut-brown. Gall-bladder large, pendant, pear-shaped, with long duct. Swim-bladder simple, with thick muscular walls, strongly attached to roof of abdominal cavity by numerous root-like appendages, resembling somewhat those of *Pogonius*. Spleen two-thirds as long as gall-bladder.

### CHAULIODONTIDÆ.

#### 41. *Chauliodus Sloanii*, Schneider.

*Chauliodus Sloanii*, SCHNEIDER, Bloch, Syst. Ichth. 1801, p. 430, tab. lxxxv (as *C. setinotus*).

*Chauliodus Sloanii*, GÜNTHER, Cat. Fish. Brit. Mus. v. 1864, p. 392.

A single individual, No. 26165, 105<sup>mm</sup> long, was taken from station 892, in 487 fathoms. The only other specimen recorded is that from the stomach of a codfish from George's Banks, preserved in the museum of the Essex Institute.

Radial formula of No. 26165: D. 6; A. 12.

### SCOPELIDÆ.

#### 42. *Myctophum*, sp.

A species, apparently undescribed, was obtained in several of the deep hauls. It is reserved for comparison with numerous other specimens of the group, as yet unelaborated, obtained by the Commission from the deep waters of the Atlantic.

### MICROSTOMIDÆ.

#### *Hyphalonedrus chalybeius*, new genus and new species.

Numerous specimens (No. 26092) of a form closely related to *Argentina* were taken, September 13, at stations 876 and 878, 120 and 142 fathoms. They are considered to represent a new generic type.\*

#### HYPHALONEDRUS, new genus.

A genus of Microstomatid fishes. Body rounded, terete. Cleft of mouth extending under the anterior third (at least) of the orbit. Eye large. Teeth in the jaws small, sharp, on the edges of the bony lips. Tongue entirely smooth. Tip of lower jaw projecting. Dorsal fin short, inserted midway in space between insertions of pectorals and ventrals.

\*Etymology: ὑφαλος = under the sea + ἐνδρος = a dweller.

Gill-arches 4. Pseudobranchiæ present. Scales moderate, pronouncedly pectinate.

The genus *Silus* Gill\* was founded upon a misconception. The scales of *Argentina silus* (Cuv.) Nilss., are "dentigerous," it is true, but not ctenoid. They are true cycloid scales, with dentigerous surfaces. The diagnosis of *Silus* Gill would include the form above described, but, as has been remarked, it was founded upon a misunderstanding, and there can be no question as to what his intention may have been.

43. *Hyphalonedrus chalybeius*, new species.

DESCRIPTION.—Body plump, terete, its height (16) contained six times and one-fourth in its length, its width (13) seven and three-fourths. The height at ventrals (16) is equal to that of the origin of dorsal, the dorsal being inserted at the highest portion of the body, its middle over the origin of the ventrals. The least height of the tail is half that of the body. The scales are moderately strong, and sharply pectinated at the edge, and arranged in regular transverse rows, overlapping in such a manner as to resemble oblique plates upon the sides. The lateral line is prominent, straight, containing about 52 scales. Between the lateral line and the origin of the dorsal are  $6\frac{1}{2}$  scales, the origin of the ventral 6. The greatest length of the head to the end of the flexible flap of the operculum (27) slightly exceeds one-fourth of the body-length, and is itself slightly more than four times the length of the snout (6). The longitudinal diameter of the orbit (8) is four times that of the interorbital space (2). The maxillary, broad and flattened posteriorly, is in length (10) one-tenth of the body, and extends back to a perpendicular from the anterior margin of the pupil. The articulation of the mandible is in advance of the posterior tip of the maxillary, its length (11) slightly greater, and it protrudes beyond the snout, when the mouth is open, a distance greater than the width of the interorbital area. When the mouth is closed its tip still projects noticeably.

The dorsal fin is located almost midway between the snout and the adipose dorsal. Its height is almost equal (19) to that of the ventral (18). The adipose dorsal is over the middle of the anal, its length half the diameter of the orbit.

The distance of the anal from the snout (76) is about three-fourths of the body-length. Its length of base (6) is equal to the length of the snout; its height (10) to that of the middle caudal rays. The caudal is furcate. The pectoral is long, subfalcate, inserted close to the branchial cleft, its tip extending to the fourteenth or fifteenth scale of the lateral line, its length (22) twice that of the mandible.

The ventral is located two-fifths of the way from the snout to the base of the caudal, and directly under the middle of the dorsal.

Radial formula: D. 11 + 1 (adipose); A. 8; C. 16; P. 17 or 18; V. 9 or 10; L. lat. about 52.

Color grayish mottled with brown, scales metallic silvery.

## Measurements.

Current number of specimen.....	26092	
Locality .....	Station 876-8	
	Milli- meters.	100ths of length.
Extreme length .....	112	
Length to base of middle caudal rays .....	97	100
Body:		
Greatest height .....		16
Greatest width.....		13
Height at ventrals .....		16
Least height of tail.....		8
Head:		
Greatest length .....		27
Width of interorbital area.....		2
Length of snout.....		6
Length of maxillary.....		10
Length of mandible .....		11
Diameter of orbit .....		8
Dorsal:		
Distance from snout.....		34
Length of base.....		12
Greatest height.....		19
Length of adipose fin.....		4
Anal:		
Distance from snout.....		76
Length of base.....		6
Height at longest ray .....		10
Caudal:		
Length of middle rays .....		10
Length of external rays.....		17
Pectoral:		
Distance from snout.....		16
Length.....		22
Ventral:		
Distance from snout .....		40
Length.....		18
Dorsal .....		11
Anal .....		8
Caudal .....		5, 7+9, 7
Ventral .....		9 or 10
Number of scales in lateral line ( <i>ca.</i> ).....		52
Number of transverse rows above lateral line.....		6½
Number of transverse rows below lateral line to ventral .....		6

## NEMICHTHYIDÆ.

44. *Nemichthys scolopaceus*, Richardson.

A single specimen, No. 26106, was taken in 252 fathoms of water at station 880. It came up clinging with its long jaws to the outside of the trawl-net.

## SYNAPHOBRANCHIDÆ.

45. *Synaphobranchus pinnatus* (Gronow) Günther.

Specimens were obtained from the following localities: Station 880, 252 fathoms; 881, 325 fathoms; 891, 487 fathoms; 894, 365 fathoms. In the last-mentioned locality a specimen was taken carrying nearly mature eggs.

## SIMENCHELYIDÆ.

46. *Simenchelys parasiticus*, Gill.

*Simenchelys parasiticus*, GILL, in Goode & Bean, Fish. Essex Co. & Mass. Bay, 1879, p. 27.

A single specimen, No. 26172, was taken at a depth of 487 fathoms at station 892.

## RAIDÆ.

47. *Raia*, unknown species.

The young of a species of skate, with body covered closely with minute sharp spines, was taken in many localities. Mr. Garman has the specimens for identification.

48. *Raia*, unknown species.

The young of another species, with an extremely long tail, was taken from large, square, short-tendriled eggs at various depths. Mr. Garman has also these.

49. *Raia lævis*, Mitchill.

Two large skates apparently of this species were taken October 2 in deep water. A cast of one of them was made.

## SPINACIDÆ.

50. *Centrophorus*? unknown species.

Mr. Garman has for identification two specimens taken at station 893, at a depth of 372 fathoms.

## MYXINIDÆ.

51. *Myxine glutinosa*, Linnaeus.

Specimens were obtained from the following localities: Stations 869, 192 fathoms; 870, 155 fathoms; 878, 142 fathoms.

**DESCRIPTION OF A NEW SPECIES OF CARANX (CARANX BEANI),  
FROM BEAUFORT, NORTH CAROLINA.**

**By DAVID S. JORDAN.**

*Caranx beani*, sp. nov.

Allied to *Caranx cibi* Poey, but much less elongate.

Color bluish above, silvery, with golden luster below; upper edge of caudal peduncle a little dusky; spinous dorsal blackish; axil dusky; no dusky spot on opercle, pectoral fin, or elsewhere.

Form rather broadly elliptic-ovate, the dorsal and ventral outlines about equally and nearly regularly curved, the depth greatest at the origin of the anal and soft dorsal, the axis of the body not far from the middle of its depth. Profile from the snout to the base of the dorsal forming a very regular curve. The greatest depth  $2\frac{2}{3}$  in total length,  $2\frac{1}{3}$  in length to the base of the caudal. Head little compressed, scarcely carinate above, the interorbital space more than half broader than the eye, which is small, shorter than snout, scarcely broader than the pre-orbital, 4 in head. Length of head  $3\frac{1}{3}$  to base of caudal, 4 in total length. Mouth comparatively small, oblique, the lower jaw very slightly projecting when the mouth is closed. Maxillary small, scarcely extending to the anterior border of the orbit. Premaxillaries anteriorly on the

level of the lower edge of the pupil. Teeth small, villiform, in a narrow band in each jaw; those in the outer series slightly enlarged; the band in the upper jaw considerably broader than that in the lower; no canine teeth; bands of villiform teeth on vomer, palatine, and tongue. Adipose eyelid little developed. Cheeks and opercles scaly. Gill-rakers long, longer than the pupil. Breast closely scaled, its scales a little smaller than those on the sides. Upward curve of lateral line not very strong. Armature of tail feeble, only those plates on the caudal peduncle itself having distinct spines; about 26 plates may be counted before they merge into the ordinary scales.

Spinous dorsal low and feeble, the highest spine scarcely as long as the snout, the last spine nearly free, short and thickish; a small procumbent spine before the dorsal; soft parts of dorsal, anal, and caudal densely covered with small scales; soft dorsal and anal low, their highest rays scarcely longer than the snout; free anal spines, separate from the fin but connected with each other, scarcely longer than the pupil; caudal fin short, not widely forked, the lobes equal, the upper lobe  $\frac{3}{4}$  length of head, the distance vertically between their tips slightly less than the length of the head; ventral fins very short, scarcely longer than snout, reaching about half way to anal; pectoral fins falcate, reaching about to the fourth soft ray of anal, their insertion on the level of the maxillary, their outer surface largely scaly; length of pectorals  $\frac{2}{3}$  the greatest depth, about equal to length of head.

Fin rays: D. VIII-I, 26; A. II-I, 23.

Two specimens of this species were obtained by Mr. Charles H. Gilbert and myself at Beaufort, N. C., in the summer of 1877. They were taken with a small seine in the harbor, close to the shore.

It agrees in dentition and many other respects with *Caranx cibi* Poey, but the latter species is much slenderer, the depth of the body being about equal to the length of the pectorals or the length of the head. I place it provisionally in the genus *Caranx*, the value of the various proposed subdivisions of the latter group not being evident.

The example from which the preceding description was taken has been presented to the United States National Museum, where it is numbered 27372.

I present a table of comparative measurements of the type *Caranx beani* and of one of Poey's types of *C. cibi*.



Table of measurements.

Species .....	Locality .....	Caranx beani. Beaufort, N. C.		Caranx cibi. Cuba.	
		Inches and 100ths.	100ths of length.	Inches and 100ths.	100ths of length.
Extreme length.....		6. 85	-----	11. 00	-----
Length to end of caudal armature.....		5. 48	100	9. 00	100
Body:					
Greatest height.....			43		33
Greatest width.....			15		14
Height at ventrals.....			38		30
Least height of tail.....			7		4
Length of caudal peduncle.....			8		10
Head:					
Greatest length.....			30		30
Distance from snout to nape.....			27		-----
Greatest width.....			15		-----
Width of interorbital area.....			11½		10
Length of snout.....			10½		10
Length of the operculum.....			8		8
Length of maxillary.....			14		11½
Length of mandible.....			16		15
Diameter of orbit.....			9		7
Dorsal (spinous):					
Distance from snout.....			43		40
Length of base.....			17		-----
Greatest height.....			9		10
(Soft) length of base.....			38		34½
Height at longest ray.....			13		12½
Anal:					
Distance from snout.....			63		-----
Length of base.....			38		31
Height at first free spine.....			4		2½
Height at longest ray.....			11		-----
Caudal:					
Length of middle rays.....			8		-----
Length of external rays.....			27		26
Pectoral:					
Length.....			30		34
Ventral:					
Length.....			13		11
Dorsal.....			VIII-1, 26		VIII-1, 25
Anal.....			II-1, 22		II-1, 22
Number of plates in lateral line.....			25		29

INDIANA STATE UNIVERSITY,  
Bloomington, Ind., November 10, 1880.

# ON A COLLECTION OF FISHES FROM EASTERN MISSISSIPPI.\*

By O. P. HAY.

The collection of fishes which it is the object of the present paper to describe was made almost wholly by the author, while on a trip along the eastern side of the State of Mississippi, during the latter part of March and the early part of April of the present year, 1880. The route taken was along the Mobile and Ohio Railroad, and extended from Corinth, near the northern line of the State, to Shubuta, a town about one hundred miles north of Mobile. Stops were made along this line of travel of from a few hours to four or five days. The conditions for col-

\*A full series of these has been presented to the National Museum.

lecting were usually very unfavorable, on account of high water and the superabundance of logs and snags. Nevertheless, I succeeded in collecting altogether 53 species. Three additional species, and additional specimens of several species that I had already secured, have since been sent me by Mr. William A. Warner, of Enterprise.

Of the 56 species named in the succeeding pages, I describe 15 as new—7 of them in the family of *Etheostomidae*, and 8 in *Cyprinidae*. Little has yet been done in the way of determining the fish fauna of this and some of the other Southern States, where so rich a field is offered to the naturalist.

At Corinth a few draws were made with the seine in a little stream that runs near the railway depot. This stream is a branch of the Tusculumbia, which eventually empties into the Mississippi through the Big Hatchee.

At Artesia, in Lowndes County, my collecting was done in Catawba Creek and its branches and ponds. This creek flows into the Tibbyhah, itself an affluent of the Tombigbee. South of this point, I next fished at Macon, in Noxubee County, on the Noxubee River. The river itself was too high to enter, and I had to content myself with working the ponds and Horsehunter Creek, which at this point flows into the Noxubee.

At Narkeeta, in Kemper County, I saw a few "Sunfishes" taken from the Sucarnoechee River, a tributary of the Tombigbee.

At Enterprise, in Clarke County, my collecting was done in the Chickasawha River and its branches, near the town. I have in my collection from that place 33 species. One species was caught with a hook from the same stream at Shubuta, in the south part of the same county. Further south this river joins the Leaf, to form the Pascagoula, which flows into the Gulf.

I have not in this paper attempted to discuss the geographical distribution of the species obtained, as this I consider useless until a much more complete survey of the State has been made. This I hope to be able to do at some future time. At the end of this paper I subjoin a list of the species obtained at each of the localities that I have named.

Types of the new species described have been furnished the National Museum, as well as duplicates of most of the others. Duplicates of some of the new species have also been placed in Professor Jordan's collection. The remainder of the collection is the property of Butler University, at Indianapolis, Indiana.

I take pleasure in acknowledging my indebtedness to Prof. D. S. Jordan for various suggestions made in reference to the species herein named, as well as for general aid obtained from his numerous papers on the fresh-water fishes of our country.

## FAMILY ETHEOSTOMATIDÆ.

## GENUS AMMOCRYPTA, Jordan.

1. *Ammocrypta gelida*, Hay, sp. nov. (No. 27,425, U. S. Nat. Mus.)

General form of the body that of *P. pellucidus* (Bd.) Ag.; terete, slender, and in life almost transparent. Head pointed. Mouth terminal, larger than in *P. pellucidus*, the maxillary bone extending back to a vertical from the anterior of the orbit.

Jaws armed with large, curved teeth. Eyes high up, 4 in the head, less than the length of the snout.

Cheeks and opercles naked. Opercular spine absent, the bone terminating behind in a thin and obtuse process.

Body almost naked; about three rows of pectinated scales along the lateral line, 65 scales in each row.

The rays of the median fins as follows: D. X, 11; A. I, 10 or 9. Dorsals separated. Length of spinous dorsal eight-ninths that of the head, and four-fifths as high as long. Soft dorsal three-fourths the length of the head, and two-thirds as high as long. Anal, in length, slightly less than soft dorsal, and a little less in height than in length.

Head in the length to base of caudal 4; depth in length  $7\frac{1}{2}$ .

Color of the body in spirits white; in life translucent, with a golden yellow band along each side. Head above dusky, from being thickly sprinkled with black points. A few such points are scattered over the whole dorsal surface. Spinous dorsal with a black spot about half way up in front. Soft dorsal, anal, and caudal slightly dusky. No spots along the sides or dorsal region.

Length to base of caudal  $1\frac{4}{5}$  inches.

Found in the Chickasawba River at Enterprise. It seems to prefer a sandy bottom.

The description of this species seems to agree pretty well with that of *Ammocrypta beanii*, published by Professor Jordan in Bulletin No. 10 of the United States National Museum. Judging from his description, however, my species is slenderer and has a head comparatively shorter. *A. beanii* has depth in length 6, head  $3\frac{3}{4}$ . The fin formula is also different, being in his species D. X, 10; A. I, 9. The coloration of the spinous dorsal is different. Nor do I observe that the soft dorsal and anal fins of my species are notably higher than they are in specimens of *P. pellucidus*.

To the generic characters given by Professor Jordan in his description of *A. beanii* I will add that of the complete absence of an opercular spine. This spine is wanting in no other Etheostomoid fishes known to me, although it is feebly developed in *Microperca punctulata*.

## GENUS PERCINA, Hald.

2. *Percina caprodes* (Raf.) Grd. (No. 27,424, U. S. Nat. Mus.)

*Percina caprodes*, JORDAN, Annals N. Y. Lyc. Nat. Hist. 1877, 312 (Synonymy)

A single specimen of the "Hog-fish", taken from the Chickasawha, has been sent me by Mr. W. A. Warner.

## GENUS HADROPTERUS, Agassiz.

3. *Hadropterus spillmani*, Hay, sp. nov. (No. 27,432.)

Body elongated, compressed. Head in the length about 4 times. Depth in the length, exclusive of the caudal fin, 5 times. Eye equal to snout, and one-fourth the length of the head.

Lateral line with from 56 to 60 scales, 6 rows above and 9 below. A row of enlarged, non-deciduous, ctenoid plates along the middle of the belly. Cheeks and opercles scaled. The whole chest covered with small plates or scales.

The fin-rays as follows: D. XII, 12; A. II, 9. Spinous dorsal about nine-tenths as long as the head, and one-half as high as long; soft dorsal three-fifths as long as the head, and five-sixths as high as long; anal equal in length to the soft dorsal, and about as high as long. Ventrals and pectorals reaching back about to the same point, two-thirds the distance from the base of the ventrals to the vent. Caudal fin truncated. Spinous and soft dorsals well separated.

The snout is rather pointed; upper jaw not protractile; mouth moderate, the maxillary reaching back to a vertical from the anterior of the orbit. Teeth on jaws, vomer, and palatines. Mouth slightly oblique.

The general color is dark above, reddish yellow below. The sides are crossed by about a dozen brown bands, which are broadest along the lateral line, where coalescing they form a dark horizontal band. This band becomes narrower and better defined on the head, and is continued along the upper edge of the opercle and cheek, through the eye, to the tip of the snout. A narrow dark line runs downward and forward from the lower edge of the orbit. There are three well-defined spots at the base of the caudal fin.

The vertical fins are blotched more or less with dusky colors; the ventrals are bluish black, while the pectorals are lighter.

The cheeks and the occipital region are pale in color; the snout and interorbital space are bluish black.

Length, exclusive of caudal fin, 3 inches.

This species is allied to *H. nigrofasciatus*, a description of which is given by Professor Jordan in the Ann. N. Y. Lyc. Nat. Hist. 1877, 310. Judging from a comparison of my specimens with his description, I think that they evidently belong to a distinct species.

Several specimens of this handsome fish were caught with small hooks in a branch flowing into the Chickasawha at Enterprise. I dedicate it to my friend Rev. William Spillman, M. D., of Enterprise, who



has spent a long life in scientific labors in the South, and who has thereby done much to increase our knowledge of the geology and natural history of his own and neighboring States.

### GENUS BOLEOSOMA, DeKay.

#### 4. *Boleosoma maculatum*, Agassiz. (No. 27, 443.)

*B. brevipinne*, COPE, Proc. Amer. Phil. Soc. 1870, 268.

A single specimen of a *Boleosoma* was obtained in Horsehunter Creek at Macon. An examination indicates that it is *B. maculatum*, although it does not agree wholly with descriptions of that species. It is much paler than specimens of that species obtained in the streams about Indianapolis. There are no dark bars on the back, and the spots usually found along the lateral line are not as conspicuous as common. The fin formula is D. VIII, 12; A. I, 8. Lateral line 50.

I do not believe that the separation of *B. olmstedii* and *B. maculatum* as distinct species can be maintained. The characters most relied on in distinguishing them are the difference in length of the soft dorsal, the difference in the number of scales along the lateral line, and the smoothness or scaliness of the cheeks. I have examined specimens in the State collection at Normal, Ill., labeled *B. maculatum*, that appear to combine these characters in all sorts of ways. Some have scaled cheeks, 55 vertical rows of scales, and dorsal fin-rays X, 12. Another specimen noted has scaled cheeks, 48 rows of scales, and dorsal rays VIII, 11. Another has bare cheeks, 53 scales, dorsal IX, 12. Another, bare cheeks, 46 scales, dorsal rays IX, 13. Specimens there labeled *B. olmstedii* seem to be in no way different.\*

As to color, I have specimens from Western Illinois that are almost black, especially the head, the vertical and the ventral fins. These are males in their breeding dress, but they appear to be unusually dark.

### GENUS NANOSTOMA, Putnam.

#### 5. *Nanostoma zonale* (Cope) Jordan. (No. 27, 417.)

*Pacilichthys zonalis*, COPE, Journ. Acad. Nat. Sci. Phila. 1869, 212.

*Nanostoma zonale*, JORDAN, Bull. U. S. Nat. Mus. No. 10, 6, 1877.

Two specimens of this beautiful species were seined in a shallow and sandy creek flowing into the Chickasawha River at Enterprise. They differ in no way from described specimens, except that none of the transverse bands anterior to the anal fin pass around the lower part of the body. Even in this respect they are like a specimen mentioned by Cope from the Miami River, in Indiana. The belly, throat, and spaces between the bars below the lateral line are, in spirits, pure white.

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\* Since the above lines were penned I have received the October number of the American Naturalist, from which I learn that Prof. S. A. Forbes, of the Illinois State Laboratory of Natural History, in his interesting article on "The Food of the Darters", regards the two so-called species as identical. Professor Jordan also informs me that he now considers the two forms as merely "subspecies".



6. *Nanostoma elegans*, Hay, sp. nov. (No. 27,445.)

Body stout and somewhat compressed. Head short and deep, with swollen cheeks. The snout is turned abruptly downward. The mouth is subterminal, horizontal, and small, the maxillary not reaching back to the vertical from the anterior of the orbit. Upper jaw not protractile. Eye in the head 4 times.

Head in the length to caudal (as in all measurements in this paper) 4 times; depth in length 5. Depth of caudal peduncle twice in its length; this equal to three tenths of the length of the body.

Rows of scales 5-42-6. Lateral line complete, nearly straight.

The formula of the vertical fins is D. X, 12; A. II, 8. The spinous dorsal slightly longer than the head, and half as high as long. Soft dorsal five-sixths as long as the head, and two-thirds as high as long. Anal three-fourths the length of the head, and as high as long, the posterior rays being the longest.

The pectoral fins are very wide and long, reaching beyond the tips of the ventrals and to the vent. Caudal fin emarginate.

Cheeks, opercles, and back of the neck scaly; the chest and the region just behind the ventrals naked. Gill-membrane broadly connected across the breast.

The general color of the body, after lying in spirits, is purple. Along the back are six large square blotches of black, and along the sides about eight broad transverse bars of the same color, but fainter; these least distinct forward. Along the lateral line, alternating with the transverse bars, are a number of spots, which, in the case of my largest specimen, are of a more intense color than the bars. These spots connect the bars, and with them form a dark lateral band.

Besides these markings, many of the scales, both within and outside the dark bars, principally above the lateral line, but also below, have at their base a jet-black dot. These dots are so arranged as to form somewhat regular longitudinal lines. At the extremity of the caudal peduncle there is a small black spot just above the last transverse bar, and another below it. There are a few black spots behind the eye; a dark bar running from the eye downward, and another from the eye forward to the snout.

Ventral and anal fins indigo-blue. Some of the same color on the pectorals. In life there is a bar of deep orange or red running along the base of both dorsals. The tips of the ventral rays in some specimens, males perhaps, are swollen.

Length of longest specimen  $2\frac{1}{2}$  inches.

Taken in a shallow, rocky, and sandy branch of the Chickasawha River at Enterprise.

The small, subinferior mouth, little compressed body, and widely connected gill-membrane ally this species to *Nanostoma*. The dorsal fins are separated as in *Nothonotus*.

## GENUS PÆCILICHTHYS, Agassiz.

7. *Pæcilichthys artesiae*, Hay, sp. nov. (No. 27,434.)

In this species the body is more elongated than usual, and considerably compressed. The head is large and contained in the length to caudal fin  $3\frac{3}{4}$  times; depth in length 5 times. Caudal peduncle contained in the length of the body  $4\frac{1}{2}$ ; its depth one-half its length.

Mouth large, the maxillary reaching to a vertical from the pupil, terminal, nearly horizontal; the lower jaw slightly shorter than the upper. Gill-membrane rather broadly connected across the breast.

The eye equal to the snout, and contained in the head  $4\frac{1}{2}$  times. The cheeks are wholly covered with small scales, resembling in this respect *P. asprigenis*, Forbes, from Central Illinois. The opercles are covered with large scales. The scales on the region between the occiput and the dorsal fin are very small.

There are along the sides about 56 vertical rows of scales, 8 horizontal rows above the lateral line and 11 below. The lateral line extends slightly behind the posterior end of the soft dorsal, being absent on about 10 or 12 scales. Just above the base of the pectoral fin, on each side, there is an enlarged black scale.

The two dorsals are contiguous, the membrane of the first reaching the second. The fin-rays are, D. XI, 13; A. II, 7. The length of the first dorsal, measured from the first to the last spine, equal to the length of the head; its height less than half its length. The soft dorsal seven-ninths the length of the head; its height about four-fifths its length. The anal is in length a little more than one-half the length of the head; its height also one-half the head.

The pectoral and ventral fins reach backward to the same point. The pectorals are much smaller than in *P. cæruleus* (Stor.) Ag., reaching back only three-fifths the distance from their origin to the vent, while in that species they extend backward four-fifths this distance.

*Color*.—Sides yellowish olive, with indications of transverse and oblique bars of dark, and sprinkled with many small blotches of carmine. Pectorals and ventrals dull blue. Dorsals with a broad band of carmine running along the middle, bordered on each side with orange. The tips of the dorsals dull blue, as is also the base of the soft dorsal. Base of the spinous dorsal with several blotches of carmine. Anal mostly crimson, tipped with blue. Caudal first blue, then orange, then carmine, followed by orange, and tipped with blue. The iris is yellow.

Length of the only specimen obtained  $2\frac{3}{8}$  inches.

From a small branch flowing into the Catawba, itself tributary to the Tombigbee.

A brilliant little fish, attracting by its bright colors the eye at a distance of many feet.

The palatine teeth of this species form a broad band, whereas in *P. cæruleus* they are few in number and in a single row.

8. *Pœcilichthys saxatilis*, Hay, sp. nov. (No. 27,433.)

In my collection there is a single specimen of another *Pœcilichthys* that appears to be undescribed. It measures but  $1\frac{3}{8}$  inches in length. The lateral line is incomplete, but extends as far back as the posterior rays of the soft dorsal, being found on 35 scales and not arched over the pectorals. There are about 50 vertical rows of scales and 11 horizontal rows, 5 above the lateral line and 6 below.

The opercula have a few large scales, but the cheeks are naked. The breast and throat are bare.

The dorsal and anal fin-rays are as follows: D. XI, 10; A. II, 7. The spinous dorsal equals the head in its length, and is one-half as high as long.

The soft dorsal is two-thirds as long as the head, and as high as long. The dorsals are separated by a space equal to one-half the head. The anal, in height and length, is equal to nearly one-half the length of the head.

The head is contained 4 times in the length of the body, the depth 5 times, and the caudal peduncle  $3\frac{1}{2}$  times. The head is narrow and pointed; the profile descends in a gradual curve. The mouth is horizontal, terminal, and large, the maxillary extending back to a vertical from the anterior edge of the pupil. The eye is equal to the snout, and is contained in the head 4 times. Upper jaw non-protractile.

In color the specimen in my possession rather resembles a *Boleosoma* or a *Bolichthys* than a typical *Pœcilichthys*. Above, the ground color is yellowish olive, below pale. On the dorsal region are about six square brown spots. Along the sides there are about eight somewhat W-shaped spots of the same color, between which and the dorsal blotches are many specks of brown arranged in zigzag lines. A black streak before the eye and another below it. Opercle mostly black. An enlarged black humeral scale on each side. All the fins, except the anal, more or less barred with dusky.

Found at Enterprise in a rocky and sandy stream flowing into the Chickasawha.

## GENUS VAILLANTIA, Jordan.

9. *Vaillantia chlorosoma*, Hay, sp. nov. (No. 27,428.)

Body slender, compressed, and the dorsal region much arched. At the vent the body is suddenly contracted into the long and slender caudal peduncle, which (measured from the posterior anal ray to base of caudal fin) is contained in the whole length of the body  $3\frac{1}{3}$  to  $3\frac{1}{2}$  times, and has a depth one-third its length. The head is small, pointed, and contained in the length from  $4\frac{1}{2}$  to  $4\frac{3}{4}$  times. Eye in the head 4. Upper jaw protractile. Mouth horizontal, moderate, subinferior, the upper jaw overlapping the lower. The depth of the body in its length from 5 to  $5\frac{1}{2}$  times.

There are from 50 to 60 vertical rows of scales, and about 12 horizontal rows between the soft dorsal and anal. The lateral line is found on

from 4 to 20 or more of the scales. Cheeks and opercles scaled. Region in front of pectoral and ventral fins sometimes scaled and sometimes naked.

The fin-rays are, D. IX, 11 (10); A. I, 7 or 8. The dorsals are separated by a distance equal to one-half the length of the head, or more. The spinous dorsal is five-sevenths as long as the head, and four-fifths as high as long. The soft dorsal has about the same dimensions. The anal is equal to one-half the head in length and height.

In color this species is of a pale greenish yellow, with many blotches and zigzag markings of brown. There is a row of about ten of these blotches on each side, most distinct on the caudal peduncles. Also there are about eight square brown spots along the dorsal region. Top of the head, a spot on the operculum, and another below the eye, dark; a line of the same color, but more distinct, from the eye to the snout.

Length of the largest specimen  $1\frac{7}{8}$  inches.

This species appears to be widely distributed, as I obtained it at Corinth in a small stream that flows into the Tuscumbia, at Artesia in Sandy Creek, and at Macon in Horsehunter Creek.

The characters of this species appear to agree in many respects with those of *Boleosoma gracile*, Girard, described in the Proc. Acad. Nat. Sci. Phila. 1859, 103. Girard's specimens were from Southwest Texas. In *B. gracile*, however, the spinous dorsal is described as being longer and lower than the soft dorsal, and the anal as being much deeper than long, which statements do not well apply to *Boleichthys chlorosoma*. I am also informed by Professor Jordan that the jaw of *B. gracile* is non-protractile.

The species that I have above described belongs to Professor Jordan's genus *Vaillantia* (Bull. U. S. Nat. Mus. No. 12, 89), the type of which is *Boleosoma camurum*, Forbes. From that species it differs, among other things, in having the two dorsals widely separated. In *B. camurum* they are contiguous.

#### GENUS MICROPERCA, Putnam.

##### 10. *Microperca præliaris*, Hay, sp. nov. (No. 27,418.)

The species about to be described may possibly belong to the genus *Boleichthys*. I have but a single specimen, which has a total length of  $1\frac{1}{2}$  inches. It was obtained at Corinth, and was at first supposed to be a specimen of *V. chlorosoma*.

The body is rather short and stout, the depth being contained in the length a little more than 4 times. Behind the vent the body becomes contracted into the caudal peduncle, which is compressed and contained in the length of the body 3 times. Its median depth is one-third its length.

The head is contained in the length 4 times. The snout conical and pointed. The jaws are equal, the upper not protractile; the mouth



terminal, slightly oblique, and rather small. The maxillary reaches back to a vertical from the anterior of the orbit. The eye is small, 4 in head, and greater than the snout. Cheeks and opercles covered with large scales. Opercular spine well developed.

The scales of the body are large, there being only 36 vertical and 11 horizontal rows, the latter counted between the dorsal and anterior of anal. The lateral line is found on but two scales anteriorly. Fin-rays, D. VIII, 11; A. I, 6. Anal II, 6, in a specimen of the same species from Alabama in the U. S. Nat. Mus. (*vide* Jordan). The two dorsals are well separated. Spinous dorsal two-thirds the length of the head, its height a little more than one-half the head. Soft dorsal with about the same dimensions. Anal spine slender and of moderate length. Length of anal 3 times in the head; its height twice its length. Pectorals and ventrals reaching nearly to the vent.

Color greenish olive, with many specks of brown. These brown specks somewhat in rows above the place for the lateral line. About ten oblong spots of brown along the sides, most distinct above the anal fin. Below, white. The usual black streaks below and in front of the eye. Dorsal fins somewhat barred.

The general appearance of this little fish is that of a *Boleichthys*, but the very short lateral line, large scales, equal jaws, &c., seem to ally it most closely to *Microperca*. From the latter it differs in having but a single anal spine and the beginnings of a lateral line. Since, however, this "lateral line" is found on the opercle of *M. punctulata*, it would not be surprising if it should be sometimes, even in that species, found on one or two of the anterior scales.

## FAMILY CENTRARCHIDÆ.

### GENUS MICROPTERUS, Lacépède.

#### 11. *Micropterus pallidus* (Raf.) Gill & Jor. (No. 27,450.)

*Huro nigricans*, DEKAY, Fauna N. Y. Fishes, 1842, 15.

*Micropterus nigricans*, COPE, Proc. Acad. Nat. Sci. Phila. 1865, 83.

*Dioplites nuceensis*, GIRARD, U. S. Pac. R. R. Surv. vol. x, 4.

*Micropterus pallidus*, JORDAN, Annals N. Y. Lyc. Nat. Hist. 1877, 314.

This species is abundant everywhere, and is esteemed as one of the best food-fishes. It is called "Trout", instead of "Bass", as at the North.

The young are conspicuously marked by a dark, sometimes interrupted, lateral band. This is sometimes found also in the adults. There is often a small patch of feeble teeth on the tongue of both this species and *M. salmoides*.

Specimens were obtained in the Catawba at Artesia, and in the Chickasawha at Enterprise.



## GENUS AMBLOPLITES, Raf.

12. *Ambloplites rupestris* (Raf.) Gill. (No. 27,451.)*Centrarchus pectacanthus*, DEKAY, Fauna N. Y. Fishes, 1842, 30.*Ambloplites aneus*, GIRARD, Pac. R. R. Surv. vol. x, 8, pl. i.

A fine specimen of this species was taken in the Chickasawha at Enterprise. Another has since been sent me by Mr. Warner.

## GENUS CHÆNOBRYTTUS, Gill.

13. *Chænobryttus gulosus* (C. & V.) Gill. (No. 27,459.)*Calliurus melanops*, GIRARD, Pac. R. R. Surv. vol. x, 11, pl. iii.*Chænobryttus gulosus*, COPE, Proc. Acad. Nat. Sci. Phila. 1865, 84.—JORDAN, Annals N. Y. Lye. Nat. Hist. 1877, 361.

A single specimen of this was obtained at Enterprise. It has many of the characteristics assigned by Professor Jordan to *Ch. viridis*. This latter species is attributed by him to the region from Virginia to Florida.

In the specimen which I caught the coloration is quite dark, being a reddish brown. Most of the scales have a dark spot in the center. This spot, on a few of the scales along the sides, is quite conspicuous. The fins are dark in color, the soft dorsal, especially behind, being marked with spots. The base of the anal is also obsoletely spotted. Tips of soft dorsal and anal in life bright red. Lower jaw and snout livid blue. The specimen agrees well with Girard's *Calliurus melanops*. I think it not unlikely that *Ch. gulosus* and *viridis* will turn out to be varieties of the same species.

## GENUS APOMOTIS, Rafinesque.

14. *Apomotis cyanellus* (Raf.) Jordan. (No. 27,449.)*Calliurus formosus*, GIRARD, Pac. R. R. Surv. vol. x, 14, pl. v, figs. 1-4.*Apomotis cyanellus*, JORDAN, Bull. U. S. Geol. Surv. vol. iv, No. 2, 398.

I obtained specimens of this widely distributed species from Catawba Creek at Artesia, and from the Noxubee at Macon.

## GENUS LEPOMIS, Rafinesque.

15. *Lepomis pallidus* (Mitchill) Gill & Jordan. (No. 27,457.)*Pomotis incisor*, DEKAY, Fauna N. Y. Fishes, 1842, 33.*Pomotis speciosus*, GIRARD, Pac. R. R. Surv. vol. x, 23, pl. viii, figs. 5-8.*Lepiopomus pallidus*, JORDAN, Bull. U. S. Geol. Surv. vol. iv, No. 2, 397.*Lepiopomus incisor*, GOODE & BEAN, Proc. U. S. Nat. Mus. 1879, 139.

Numerous specimens of the above species were obtained in Catawba Creek at Artesia, Noxubee River at Macon, and in the Chickasawha at Enterprise.

16. *Lepomis obscurus* (Ag.) Jordan. (No. 27,458.)*Pomotis obscurus*, AGASSIZ, Amer. Journ. Sci. and Arts, 1834, 302.*Lepiopomus obscurus*, JORDAN, Annals N. Y. Lye. Nat. Hist. 1877, 317.

A fine example of this species, 6 inches long, was obtained with the hook from Sucarnochee Creek at Narkeeta, a station on the Mobile and Ohio Railroad.

This species is distinct from *L. pallidus*, although closely related to it. The color is much darker. Each scale has in its center a dark spot, longest up and down. The opercular flap is longer and more abruptly formed than in *L. pallidus*. The opercular flap, measuring from where the scales cease, is equal to the diameter of the eye, while in *L. pallidus* it is equal to only two-thirds the eye's diameter. The pectoral and ventral fins reach fully to the first anal spine.

17. *Lepomis fallax* (B. & G.) Hay. (No. 27,456.)

*Pomotis fallax* and *convexifrons*, B. & G. Proc. Acad. Nat. Sci. Phila. 1854, 24.

*Pomotis fallax*, GIRARD, Pac. R. R. Surv. vol. x, 27, pl. ix, fig. 5.

While at Enterprise I obtained some small specimens of a Sunfish which belongs to Professor Jordan's genus *Xenotis*. I saw several adult specimens, but could procure none from their captors, who took professional pride in their long "strings". My attention was especially attracted to this fish by its immense opercular flap. Since returning home, Mr. William A. Warner, of Enterprise, has kindly sent me additional material, and, among other things, a specimen of this fish, having a total length of 6 inches. After a careful study of this species my conclusion is that it is the *Pomotis fallax* of Baird and Girard, described from Northern Texas. The agreement with the description and figures given in the Pacific Railroad Survey Report is very close indeed. Fig. 5, pl. ix, gives a very good although somewhat reduced representation of my largest specimen.

*Xenotis solis*, Gill & Jor. (Bull. U. S. Nat. Mus. No. 10, 22), not *Pomotis solis*, C. & V. (see Proc. U. S. Nat. Mus. 1879, 225), is a more elongate species, the greatest depth being contained  $2\frac{1}{2}$  times in the length instead of 2, as in my specimens. The eye of that species is contained in the flap  $1\frac{1}{2}$  times instead of 2, as in this. The flap of that is contained  $2\frac{1}{2}$  times in the rest of the head instead of 2 times, as in this. In that there are "about 5 rows [of scales] above and 11 below" the lateral line; in this there is one more both above and below.

From *P. breviceps*, B. & G., it appears to differ in having a larger eye, a more anterior dorsal fin, and longer ventral fins; from *X. megalotis*, in that the body is not so heavy anteriorly.

I cannot give a description of the colors in life, except that they are brilliant. In spirits the body above is yellowish brown, the scales being dark-edged; fins dusky, narrow blue stripes on the cheeks; flap jet-black, with a pale edge.

Professor Jordan informs me that he now regards *L. fallax* as simply a variety of *L. megalotis*. I have not had the opportunity to examine enough material to enable me to satisfy myself of the correctness of this conclusion. He also discards the genus *Xenotes*.

## GENUS CENTRARCHUS, Cuvier.

18, *Centrarchus irideus* (Lac.) C. & V.*C. irideus*, JORDAN, Bull. U. S. Nat. Mus. No. 10, 31.

At Narkeeta, on the Mobile and Ohio Railroad, I saw a specimen of *Centrarchus* taken from the Sucarnochee River, but was not able to procure it. From an examination made at the time I regard it as being *C. irideus*. It appeared, however, to have some of the characters of *C. macropterus*; there being, for instance, 8 anal spines instead of 7, the usual number.\*

## GENUS POMOXYS, Rafinesque.

19. *Pomoxys nigromaculatus* (Le S.) Girard. (No. 27,461.)*Centrarchus hexacanthus*, DEKAY, Fanna N. Y. Fishes, vol. iv, 1842, 31.*Pomoxis nigromaculatus*, GIRARD, Pac. R. R. Surv. vol. x, 6.

Numerous specimens of this were taken from Horsehunter Creek at Macon. Both this and the next are much sought after as food and to stock fish-ponds.

20. *Pomoxys annularis*, Rafinesque. (No. 27,460.)*Pomoxis annularis* and *nitidus*, GIRARD, Pac. R. R. Surv. vol. x, 6.

Same locality as above.

## FAMILY ELASSOMATIDÆ.

## GENUS ELASSOMA, Jordan.

21. *Elassoma zonatum*, Jordan. (No. 27,452.)*Elassoma zonatum*, JORDAN, Bull. U. S. Nat. Mus. No. 10, 50; Bull. Ill. Lab. Nat. Hist. No. 2, 47.

Two specimens of this interesting species were secured in a pond along the Noxubee River at Macon. The largest was  $1\frac{5}{8}$  inches in length, somewhat larger than the specimens hitherto found. After careful search I have been unable to find any evidences of the existence of vomerine teeth in this species. The fin-formula is, D. I; V, 10; A. III, 5 or 6. The scales are very small and difficult to count. As nearly as I could make out, there are 42 vertical rows and 18 or 20 horizontal rows between anal and dorsal. The pseudobranchiæ are obsolete.

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\* Since this paper has gone to press, Professor Jordan writes me that he is now satisfied that *C. macropterus* and *C. irideus* are identical, and that as the term *macropterus* has the priority, it must be accepted as the name of the species. He had already, in his "Catalogue of the Fishes of Illinois," published in Bull. No. 2, Ill. Lab. Nat. Hist., expressed the opinion that they might have to be merged into one.

## FAMILY APHREDODERIDÆ.

## GENUS APHREDODERUS, Le Sueur.

**22. *Aphredoderus sayanus* (Gilliams) DeKay.***Aphredoderus sayanus*, DEKAY, Fauna N. Y. Fishes, 35.*Aphododerus isolepsis* (NELS.) JORDAN, Bull. Ill. Lab. Nat. Hist. No. 2, 48.*Aphrodedirus cookianus*, JORDAN, Proc. Acad. Nat. Sci. Phila. 1877, 60.

A single small specimen was obtained at Macon. All the names cited above belong to varieties of the same species. DeKay mentions that this species occurs at New Orleans.

## FAMILY CYPRINODONTIDÆ.

## GENUS ZYGONECTES, Agassiz.

**23. *Zygonectes notatus* (Raf.) Jordan. (No. 27,444.)***Zygonectes notatus*, JORDAN, Bull. U. S. Nat. Mus. No. 9, 47.

Many fine specimens of this species were taken. I have them from Corinth, Artesia, Macon, and Enterprise. This and the succeeding species are seen almost everywhere, especially in quiet waters, swimming near the surface. One of my specimens from Enterprise is 3 inches long to the caudal, or a total of  $3\frac{1}{2}$  inches.

The color is translucent yellowish green above, silvery white below, with a broad, dentate, lateral band of black. There are four or five longitudinal rows of black dots above the lateral band, especially conspicuous in specimens from Enterprise. The fins are golden, the dorsal and caudal dotted with black.

**24. *Zygonectes melanops* (Cope) Jordan. (No. 27,427.)***Haplochilus melanops*, COPE, Proc. Amer. Phil. Soc. 1870, 457.*Zygonectes melanops*, JORDAN, Bull. Ill. Lab. Nat. Hist. No. 2, 52.

Many of these little fishes were seined in the ponds and rivulets along Catawba Creek in the vicinity of Artesia, and in Horsehunter Creek near Macon. They correspond closely with Professor Cope's description cited above. This species appears to have a very wide distribution. It was originally described by Professor Cope from the Neuse River, in North Carolina. It was next discovered in Southern Illinois by Prof. S. A. Forbes, the accomplished superintendent of the Illinois State Laboratory of Natural History. I have now the pleasure of announcing its occurrence at points much farther south.

## FAMILY HYODONTIDÆ.

## GENUS HYODON, Le Sueur.

**25. *Hyodon selenops*, Jordan & Bean. (No. 27,455.)***Hyodon selenops*, JORDAN, Bull. U. S. Nat. Mus. No. 10, 67.

This beautiful species appears to be abundant in the Chickasawha River. At Enterprise, where I saw a number taken from the water

with hooks, they are called "Hickory Shad". They are not esteemed very highly as a means for gratifying the palate. This species is reported from the Tennessee and Cumberland Rivers.

## FAMILY CLUPEIDÆ.

### GENUS CLUPEA, Artedi.

#### 26. *Clupea chrysochloris* (Raf.) Jor. (No. 27,453.)

*Pomolobus chrysochloris*, RAFINESQUE.

A single specimen of this species has been sent me by Mr. William A. Warner, of Enterprise.

### GENUS DOROSOMA, Rafinesque.

#### 27. *Dorosoma cepedianum* (Le S.) Gill. (No. 27,454.)

*Dorosoma cepedianum*, JORDAN, Proc. Acad. Nat. Sci. Phila. 1877, 69; subsp. *heterurum*, Bull. U. S. Nat. Mus. No. 10, 65.

Several specimens of this species were caught while seining a deep pond along the Noxubee River near Macon. I do not find that the characters assigned by Professor Jordan to the variety *heterurum* exist in my specimens, unless it be that of the long filamentous ray of the dorsal fin. Even this distinction does not always hold good. I find no particular differences between my largest specimen, 8½ inches long, and a specimen of the same size from the Potomac.

## FAMILY CYPRINIDÆ.

### GENUS HYBORHYNCHUS, Agassiz.

#### 28. *Hyborhynchus notatus* (Raf.) Ag. (No. 27,441.)

*Hyborhynchus notatus*, COPE, Trans. Amer. Phil. Soc. 1869, 392.

A single specimen obtained at Corinth; many in the waters about Artesia and Macon. In their coloration some of the specimens that I obtained are different from any that I have seen from other localities and from any descriptions that have fallen under my eye. These peculiarities of color are observed only in the largest individuals, those 2½ inches in length. Some of these are quite brown, this color being produced by each scale having a black border. The head is blue-black, of varying degrees of intensity, being in some cases almost jet-black. There is a deep black band occupying the whole upper half of the dorsal fin. The greater part of the caudal fin is also black, the base and tip only being light. There is sometimes a black spot near the tip of the posterior rays of the anal fin. In many of these dark-colored specimens the dark lateral band usually seen in this species is either obsolete or indistinct. These highly colored individuals are, no doubt, males in their wedding suits of black. The other party does not dress so gorgeously.



## GENUS HYBOGNATHUS, Agassiz.

29. *Hybognathus argyritis*, Girard. (No. 27,431.)

*Hybognathus argyritis*, GIRARD, Pac. R. R. Surv. vol. x, 235; Proc. Acad. Nat. Sci. Phila. 1856, 182.

Specimens of this species were seined in Horsehunter Creek at Macon, and in the Chickasawha River at Enterprise. Some of these have a total length of  $4\frac{1}{2}$  inches.

## GENUS ALBURNOPS, Girard.

30. *Alburnops taurocephalus*, Hay, sp. nov. (No. 27,439.)

This very interesting species resembles much *Hyborhynchus notatus*, and therefore recalls strongly Professor Cope's description of *Hybopsis tuditanus*, from Northern Indiana. (See Trans. Amer. Phil. Soc. 1869, 381.) It is a true *Hybopsis*, or *Alburnops*, as indicated by the short alimentary canal and the close union of the spinous dorsal ray to the first soft dorsal. The teeth are 4-4, hooked, compressed, and provided with a masticatory surface.

The body is stout, somewhat compressed, broad and flat above, with a deep and angulated caudal peduncle. The latter is contained in the body about  $3\frac{3}{4}$  times. Its depth is one-half its length. The head is broad and flat above, and at the temporal region forms an angle with the cheeks. The breadth of the head behind the eyes is equal to the distance from the muzzle to the back of the orbit, and nearly two-thirds the length of the head. The muzzle is broad and obtuse; but not so truncate as that of *Hyborhynchus notatus*, since the profile rounds gradually into the snout.

The mouth is rather small, horizontal, and terminal; the jaws about equal, the upper heavy. The maxillary hardly reaches a perpendicular from the anterior margin of the orbit. Eye large,  $3\frac{1}{2}$  in the head. Head in the length, exclusive of the caudal,  $4\frac{1}{2}$  times. Depth about equal to the length of the head.

Dorsal I, 8; A. I, 7. The dorsal begins above the ventrals, is longer than high, and has on the anterior rays, rather below the middle, a black spot. This fin commences nearer the snout than the caudal. The anal is small.

The scales along the lateral line are rather large and silvery; the formula is 8-43-4. The scales in front of the dorsal fin are small, especially on the nape.

In color this species is pale yellow, with a dusky tinge given it by numerous black punctulations on each scale. The sides are silvery, as are also the cheeks and opercles. There is an obsolete dusky band along the lateral line, terminating at the base of the caudal in a small but distinct black spot. The top of the head and snout brown.

Length of the largest specimen 3 inches, exclusive of caudal.

From the Chickasawha at Enterprise. Caught for bait for larger fishes, and called "Bull Heads".

While this species must resemble *H. tuditanus*, it evidently is distinct from it. The dorsal fin of that species is said to be markedly nearer to the caudal than to the end of the muzzle, while the contrary is true in my species. If the horizontal rows of scales have been counted correctly, and in the same way in both species, there is one more row above the lateral line in mine than in Professor Cope's species. The mouth in *H. tuditanus* is said to be very small and inferior, as in *Hyborhynchus notatus*. The latter feature certainly does not belong to the present species.

**31. *Alburnops longirostris*, Hay, sp. nov. (No. 27,440.)**

The general appearance of this species is much like that of small specimens of *Ericymba buccata*.

Head rather small, contained in the body  $4\frac{1}{2}$  times. Eye small, being contained in the head 4 times; not equaling the snout, which is one-third the length of the head. The upper jaw is rounded and much overlaps the lower jaw. The mouth, therefore, inferior, rather large, horizontal. The maxillary attains a vertical from the anterior of the orbit. Teeth 4-4, hooked, and having a triturating surface.

Lateral line somewhat decurved. Scales large, there being 36 along the lateral line, 4 horizontal rows above, and only 3 below. About 12 large scales in front of the dorsal. Depth in length  $4\frac{3}{4}$  to 5.

Origin of the dorsal fin midway between the tip of the snout and the base of the caudal and directly over the insertion of the ventrals. Rays of dorsal I, 8; anal I, 7. Dorsal nearly twice as high anteriorly as long; anal short and low. Caudal deeply forked, nearly one-fourth the length of the body. Pectorals far from reaching the ventrals; these extending fully to the vent.

Caudal peduncle in body  $3\frac{3}{4}$  times; its greatest width nearly one-half its length.

This fish is of a pale straw-color, slightly dusky from the brown edges of the scales. There is a very narrow, dark dorsal line; also an obsolete lateral band just below the lateral line. Top of the head brown; the vertical fins dusky.

Length of the largest specimen 2 inches. Seined in considerable numbers at Enterprise. The females teem with eggs.

**32. *Alburnops xænocephalus*, Jor. (No. 27,435.)**

*Hybopsis xænocephalus*, JORDAN, Annals N. Y. Lyc. Nat. Hist. 1877, 335.

*Alburnops xænocephalus*, JORDAN, Bull. U. S. Geol. Surv., vol. iv, No. 2, 420

Several specimens of a dark-colored minnow were seined at Enterprise the resemblance of which to *H. xænocephalus* is so close that I have referred them to that species, so well described by Professor Jordan in his "Fishes of Upper Georgia". There are some differences, however, that I have thought worthy of mention.

The body in my specimens is deeper, the depth being contained in the length but  $4\frac{1}{2}$  times or less. The back does not seem to be so broad nor the caudal peduncle so deep. The dark band that occurs on the caudal peduncle of typical specimens from Georgia is, in these from Mississippi, continued forward along the side to the snout; being, however, slightly broader and less perfectly defined anteriorly.

I do not, however, think that the differences form sufficient grounds for establishing a new species. My largest specimens have a total length of 3 inches.

Professor Jordan's specimens were obtained in the upper tributaries of the Alabama River.

### GENUS HEMITREMIA, Cope.

#### 33. *Hemitremia maculata*, Hay, sp. nov. (No. 27,438.)

Body long and slender, slightly elevated at the dorsal, somewhat compressed. Depth in the length 5 times. Head flattened above; snout, looked at from above, obtuse. Mouth small, the maxillary falling considerably short of the anterior border of the orbit, terminal, slightly oblique. Teeth 4-4, with grinding surface.

Head in the length  $4\frac{1}{2}$  times. Eye in head  $3\frac{1}{2}$ , about equal to the snout.

The fin-rays are, D. I, 8; A. I, 8. The dorsal begins slightly behind the ventrals. Its length three-fifths, its height four-fifths, of the head. Anal, in length, one-half, in height two-thirds, the head. Caudal peduncle one-fourth the length of the body. Dorsal situated nearer to the snout than to base of caudal.

The pores of the lateral line are found on but 8 or 10 scales, anteriorly. Scales 5-38-3.

This fish is of a straw-color above, with the scales brown edged. There is a faint, narrow dorsal band, and another narrow, dark line running from the vent on each side of the anal fin to the base of the caudal. A leaden band runs along the sides, which is rendered dusky by numerous black punctulations on the scales within this band. Besides these minute punctulations there is on each scale along the center of the band a pair of larger black points. Posteriorly the lateral band ends in a black spot nearly as large as the eye. Snout and top of the head dusky.

A single specimen,  $2\frac{1}{2}$  inches long, and a few young, were obtained at Enterprise.

Three other species of *Hemitremia* are recorded. *H. vittata*, Cope, has teeth 4-5, with a black lateral band, and other paler ones above this. *H. heterodon* and *H. bifrenata*, described by the same author, both have teeth 4-4. They both appear to be less elongated species than the one described above, and neither are mentioned as having the conspicuous caudal spot of *H. maculata*, which is exhibited in all the specimens that I secured. In *H. heterodon* the "lateral line is posteriorly imperfect". In *H. bifrenata* there are 12-13 rows of scales in front of dorsal, and

there are 7 rays in the anal fin. In *H. maculata* there are about 16 scales in front of the dorsal, and the anal rays are I, 8.

This species will come under Professor Jordan's genus *Chriope*. (Bull. U. S. Geol. Surv. vol. iv, No. 4, 787.)

### GENUS LUXILUS, Rafinesque.

#### 34. *Luxilus cornutus* (Mitch.) Raf.

*Hypsilepis cornutus*, COPE, Trans. Amer. Phil. Soc. 1869, 372.

Three specimens of the young of this widely diffused species were obtained at Corinth, and many others at Enterprise.

#### 35. *Luxilus chickasavensis*, Hay, sp. nov. (No. 27,419.)

This species closely resembles *Codoma stigmatura*, Jordan, from the Alabama River, originally described as *Photogenis stigmaturus*. (Annals N. Y. Lye. Nat. Hist. 1877, 337.) If *Codoma* is to be regarded a valid genus, and if *Ph. stigmaturus* belongs to that genus, then the present species will be *Codoma chickasavensis*. I do not, however, believe that there is sufficient grounds for putting *Photogenis stigmaturus* and *Luxilus analostanus* into different genera. So far as I can determine with the aid of a good microscope, the masticatory surface as truly exists on the teeth of *Ph. stigmaturus* as on those of *Lux. analostanus*. Sometimes in the former species one edge is serrated; and in some species of *Codoma*, as this genus is limited by Professor Jordan, occasionally both boundaries of the concave surface are serrated. I hope, at no distant period, to be able to discuss this subject still further. For the present I adopt the name *Luxilus* for both this species and *Luxilus analostanus* (Grd.) Jor.

In a close comparison of the present species with *Codoma stigmatura*, I find the following differences to exist: There are fewer scales along the lateral line, 38 to 40 instead of 45. The eye is also considerably larger, being contained in the head  $3\frac{1}{2}$  times instead of  $4\frac{1}{2}$ , and about equal to the snout. The caudal spot is as intensely black as in *C. stigmatura*, but considerably smaller. It is about as large as the eye, sometimes smaller; whereas in that species it is nearly always larger, being in length "usually about one-third of the head". In this species it is about one-fourth of the head. Neither does it extend so far on the rays of the caudal fin. The form of the head and body, and the position and size of the fins, are apparently the same as in *C. stigmatura*, unless it be that the body is a little deeper, the depth being contained in the length from 4 to  $4\frac{1}{4}$  times.

The black spot on the posterior rays of the dorsal fin is obsolete or wanting, while there is a narrow dark line running up on one or two of the anterior dorsal rays.

There are, on the heads of a few of my specimens, some evidences of the existence of tubercles.



This species appears to be quite abundant in the Chickasawha at Enterprise. The largest individuals obtained have a total length of 4 inches.

GENUS ERICYMBA, Cope.

36. *Ericymba buccata*, Cope. (No. 27,421.)

*Ericymba buccata*, COPE, Proc. Acad. Nat. Sci. Phila. 1865, 87; Trans. Amer. Phil. Soc. 1869, 361.

Several individuals of this species were seined in the Chickasawha River at Enterprise. Its geographical distribution is stated by Professor Jordan, in his "Catalogue of the Fresh Water Fishes of North America" (Bull. U. S. Geol. Surv. vol. iv, No. 2), to be from Pennsylvania to Illinois. Judging from the numbers taken at Enterprise, the species is quite as common in the South as farther north. Some of the specimens taken were 3 inches long, exclusive of the caudal.

GENUS OPSOPCEODUS, Hay, gen. nov.

(Ὀψορροῖς + ὀδοῖς.)

Body fusiform, moderately elongated, slightly compressed. Mouth very small, very oblique, peculiar. Teeth raptorial, with a well-developed masticatory surface, both bounding edges of which are conspicuously serrated, standing in a single row of 5-5 on a prominent process of the pharyngeals. Dorsal somewhat behind the anterior line of the ventrals. Barbels none. Lateral line complete. Intestine short. Anal fin short.

This genus is apparently related to *Myloleucus*, Cope, and it is possible that the species that I describe below will have to be put under that genus. For the present, however, I think that the peculiar form of the mouth and the teeth, as well as the general organization of the animal, will serve to separate it from *Myloleucus*. The name is given in allusion to the thoroughness with which the food is prepared by the numerous serrated pharyngeal teeth.

37. *Opsopceodus emiliæ*, Hay, sp. nov. (No. 27,429.)

Form of the body as given above. Depth in the length  $4\frac{1}{3}$  times. Head in the length  $4\frac{1}{2}$ . Muzzle blunt and rounded. Mouth very small, very oblique, the lower jaw in the closed mouth fitting within the upper. In this case the cleft is nearly vertical. The length of the mandible equal to the distance from the tip of the snout to the anterior margin of the orbit; while in *Notemigonus chrysoleucus*, which has a small mouth, the mandible reaches to the middle of the pupil. Eye greater than the snout, 3 in the head.

Dorsal and anal fin-rays as follows: D. I, 9; A. I, 8. Dorsal beginning over the posterior rays of the ventrals, nearer the snout than to the base of the caudal; length two-thirds the head; its height equal to the length of the head. The anal fin in its length one-half the head; its height a little less than the length of the head.



Pectorals not reaching the ventrals; the latter attaining the anal. The caudal is furcated for more than one-half its length. Caudal peduncle slender,  $3\frac{1}{2}$  times in the length of the body.

Scales in very regular rows, anteriorly somewhat higher than long; the rows 5 or 6-40-3.

Color in spirits pale yellow above, sides silvery, and golden yellow below. Above and on the caudal peduncle the scales with a narrow dusky edge, giving these parts of the body a regularly checkered appearance. A dusky band runs along the lateral line, back on the rays of the caudal, and forward over the opercle, through the eye, to the snout. Sometimes this band is almost black. Just above this band are two or three longitudinal rows of black dots, one of which dots is located at the tip of each scale. Below the lateral line is another similar row of dots. There is also a row of black points along the lateral line. The anterior rays of the dorsal fin are largely black, and there is also a black spot on the posterior rays.

This is an elegant and very interesting species. Its oblique mouth and rounded muzzle give it a peculiar appearance. It appears to be widely distributed through the State. I have one specimen from Artesia, several from Macon, and one from Enterprise.

#### GENUS MINNILUS, Rafinesque.

##### 38. *Minnilus dilectus* (Girard) C. & J.

*Minnilus dilectus*, JORDAN, Proc. Acad. Nat. Sci. Phila. 1877, 80.

*Alburnus dilectus*, GIRARD, Proc. Acad. Nat. Sci. Phila. 1856, 193.

*Alburnellus dilectus*, GIRARD, Pac. R. R. Surv. vol. x, 259.

*Notropis atherinoides*, JORDAN, Bull. Ill. Lab. Nat. Hist. No. 2, 60; Bull. U. S. Geol. Surv. vol. iv, No. 2, 422.

A single specimen of a *Minnilus*, or *Alburnellus*, answering well enough to Girard's description cited above, was obtained at Enterprise.

#### Subgenus LYTHRURUS, Jordan.

##### 39. *Minnilus punctulatus*, Hay, sp. nov. (No. 27,430.)

Body short, deep, and compressed. The back elevated in front of the dorsal. Depth in the length  $4\frac{1}{3}$ . The head is short and deep,  $4\frac{2}{3}$  in the length. The profile is straight, or even a little concave; the snout pointed. Mouth large and quite oblique; the lower jaw longer than the upper. The maxillary reaches back to a perpendicular from the anterior rim of the orbit.

The eye is of medium size, being contained in the length of the side of the head  $3\frac{1}{2}$  times.

The scales are very small. There are 10 to 12 horizontal rows above the lateral line, and 3 below it; 48 to 50 scales along the lateral line, and 25 or more in front of the dorsal. The lateral line is much decurved above the ventrals.

Teeth, 2, 4-4, 2, usually with an evident triturating surface.

Fin-rays as follows: D. I, 8; A. I, 10-11. Dorsal beginning midway between the muzzle and the base of the caudal; its length one-half, its height two-thirds, the head. Anal in length three-fifths, in height four-fifths, the head. Caudal peduncle compressed, and contained in the length of the body  $4\frac{1}{2}$  times.

The body is of a straw-color above, silvery along the sides and below. The scales above the lateral line are dark-edged from a succession of black dots, which are large enough to be seen by the unaided eye. A dark dorsal line of similar, but a little larger, black points. Along the sides anteriorly are a few such dots; posteriorly they increase so much that on the caudal peduncle they form a dark band. The head, and especially the snout, are sprinkled with similar dots. There is a black spot at the base of the dorsal fin anteriorly. Opercles silvery. Size of largest specimens 2 inches. Corinth.

This minnow resembles somewhat *Notropis lirus*, Jord., but is a less slender species, has a smaller eye, and has not the conspicuous band of metallic blue of that species. *Notropis matutinus* (Cope) Jord., also appears to be a much slenderer species, the depth being contained in the length 6 times. Also there are said to be but 7 rows of scales above the lateral line.

I do not think that there are sufficient differences in the teeth of the species of *Notropis*, or *Minnilus*, and those of *Lythrurus* to justify the separation of these species into two genera. If there is such difference, *Notropis lirus* ought to be written *Lythrurus lirus*, for the masticatory surfaces of its teeth are as plain, to me at least, as in *L. diptemius*.

**40. *Minnilus rubripinnis*, Hay, sp. nov. (No. 27,420.)**

Body long and slender, somewhat compressed, the depth in the length  $4\frac{2}{3}$  times. Head arched transversely above; muzzle very pointed. Mouth oblique, large; the lower jaw slightly longer than the upper; the maxillary reaching to a vertical from the front of the eye. The eye is large, being contained in the length of the side of the head 3 times, and its diameter slightly greater than the snout. Head contained in the length  $4\frac{1}{2}$  times.

Scales small, especially in front of the dorsal fin, somewhat higher than long, but not so densely imbricated as in the next species. Rows of scales represented by the formula 7 to 9-45 $\pm$ -3. Lateral line much decurved anteriorly.

The dorsal is situated far back, midway between the pupil of the eye and the base of the caudal, and considerably posterior to the ventrals; its rays, I, 8; its length one-half the head, its height three-fourths. The anal is long, being three-fourths the length of the head, height one-half the head; its rays, I, 12.

The pectorals do not reach the ventrals; the latter attain the vent.

The coloration of this species is dark in spirits, all the scales above the lateral line being covered with black points. Along the sides is a

broad leaden band, which narrows behind on the caudal peduncle and becomes a dusky band, ending in an ill-defined caudal spot. There is a narrow dorsal band. The top of the head and snout, as well as the lower jaw, are dusky. The belly is pale.

The dorsal and caudal are red, with more or less dusky. There is no dark spot at the base of the dorsal, as in some species of *Lythrurus*; but there is a distinct black spot on the upper part of the anterior rays of the dorsal. There is a similar black spot at the distal ends of the anterior anal rays. The anterior rays of the pectorals are dusky.

Large numbers of this species were collected at Enterprise. The largest specimens have a total length of  $2\frac{1}{4}$  inches.

**41. *Minnilus bellus*, Hay, sp. nov. (No. 27,426.)**

Adults of this species resemble much the young individuals of *Notemigonus chrysoleucus*.

The body is short, deep, and considerably compressed. The dorsal region is elevated. Depth contained in the length about  $3\frac{3}{4}$  times. Head short, in length of body from 4 to  $4\frac{1}{3}$  times. Muzzle short, rather pointed; the profile in adults concave; mouth quite oblique, large, the maxillary reaching back to the anterior rim of the orbit; the lower jaw rather longer than the upper. The eye moderate,  $3\frac{1}{2}$  in the head.

The lateral line is much decurved anteriorly. Scales 7 or 8—40 to 42—3, crowded forward, higher than long, about 25 in front of the dorsal. Teeth 2, 4—4, 2, "sharp-edged", but *with* a "masticatory surface".

Fin-rays, D. I, 8; A. I, 10—11. Dorsal situated midway between the tip of the snout and the origin of the caudal, wholly posterior to the ventrals, nearly twice as high as long, its length being contained in the head  $1\frac{2}{3}$  times. Anal contained in the head  $1\frac{1}{2}$  times, a little higher than long, ventrals reaching the vent, the pectorals not extending to the ventrals. Caudal peduncle very little longer than the head, and rather slender.

Color (in spirits) somewhat dusky above, with a narrow, dark dorsal line; sides silvery, with a dull, leaden line along the caudal peduncle. Occasionally, in some of the most highly colored specimens, a few scales on the side are widely margined with black, so that the sides appear splotched. The lower part of the body is in life almost flame-color. All the fins orange, at least at their bases. At least the tips of the dorsal, ventral, and caudal jet-black. No spot at the base of dorsal. In some adults the whole dorsal has black pigment mingled with the orange, besides having the rays tipped with black, and the distal half of the ventrals and anal black. Very few specimens are without the black tips to the fins, so that this becomes a distinctive character. Evidences of the existence of tubercles were observed on the heads of a few specimens.

Thirty-six individuals were captured at Artesia and four at Macon. Length from 2 to  $2\frac{3}{4}$  inches.

This species must be closely allied to *Lythrurus atripes*, Jordan, found by Prof. S. A. Forbes in Southern Illinois. The differences are, however, sufficiently evident. The larger eye, shorter head, fewer scales along the lateral line, and the fewer soft rays in the dorsal fin will distinguish my species from that. The peculiar coloration of the fins and the lack of the dorsal spot will furnish the most obvious differences.

This species illustrates well the little value of the character most relied on for separating the *Lythruri* as a genus from the species of *Minnilus*. While the external characters are all, or nearly all, those of a typical *Lythrurus*, the teeth are decidedly "sharp-edged", as that term must be defined in order to be applicable to other species with "sharp-edged" teeth.

Under the subgenus *Lythrurus* I would arrange the following species. There may be others that ought to be included:

*Minnilus diplamius* (Raf.) Hay.—Cope, Proc. Acad. Nat. Sci. Phila. 1867, 162. Pennsylvania to Illinois.

*M. cyanocephalus* (Copeland) Hay.—Jordan, Proc. Acad. Nat. Sci. Phila. 1877, 70. Michigan to Minnesota.

*M. atripes* (Jord.) Hay.—Jordan, Bull. Ill. Lab. Nat. Hist. No. 2, 59. Southern Illinois.

*M. rubripinnis*, Hay.—Mississippi.

*M. ardens* (Cope) Hay.—Cope, Proc. Acad. Nat. Sci. Phila. 1867, 163. Virginia and North Carolina to Kentucky.

*M. bellus*, Hay.—Mississippi.

*M. lirus*, Jordan.—Jordan, Annals N. Y. Lye. Nat. Hist. 1877, 342.

*M. punctulatus*, Hay.—Mississippi.

As an aid to the identification of the species given above, I insert the following analytical table:

- I. Elongated species; depth in length  $4\frac{1}{2}$  or more times.
  1. Color pale, with a lateral metallic blue band.....M. LIRUS.
  2. Colors conspicuous—steel-blue, red, and purplish.
    - a. A black spot at the base of the dorsal; first ray of dorsal opposite the ventrals; A. I, 11 .....M. ARDENS.
    - b. A black spot at the tips of the anterior dorsal rays; first dorsal ray behind the ventrals; A. I, 12 .....M. RUBRIPINNIS.
- II. Deep and compressed species; depth  $4\frac{1}{3}$  times or less in the length.
  1. Species with a distinct black spot at the base of dorsal.
    - a. Species with conspicuous hues; the dorsal surface dusky; sides and fins with more or less crimson.
      - \* Eye small, 4 in head; depth  $3\frac{3}{8}$  in length; D. I, 7; A. I, 11.....M. ATRIPES.
      - \*\* Eye in head  $3\frac{1}{4}$ ; depth in length  $3\frac{3}{8}$ ; D. I, 9; A. I, 11.....M. DIPLEMIUS.
      - \*\*\* Eye in head  $3\frac{3}{8}$ ; depth in length 4; D. I, 8; A. I, 11 or 12.....M. CYANOCEPHALUS.
    - b. Color pale; scales coarsely punctulated, small, 10 to 12-48 to 50-3; spot small.
      - M. PUNCTULATUS.
  2. No distinct spot at the base of the dorsal; fins tipped with black.....M. BELLUS.



## GENUS NOTEMIGONUS, Rafinesque.

42. *Notemigonus chrysoleucus* (Mitch.) Jor. (No. 27,423.)*Stilbe americana*, COPE, Trans. Amer. Phil. Soc. 1869, 339.*Notemigonus chrysoleucus*, JORDAN, Bull. U. S. Nat. Mus. No. 2, 404 (Synonymy).

Specimens of this fish were obtained at Corinth, Artesia, and Macon.

## GENUS SEMOTILUS, Rafinesque.

43. *Semotilus corporalis* (Mitch.) Put.*Semotilus corporalis*, COPE, Trans. Amer. Phil. Soc. 1869, 363.

A single young specimen was seined from the ponds along Catawba Creek at Artesia.

## GENUS CERATICHTHYS, Baird.

44. *Ceratichtys biguttatus* (Kirt.) Bd. (No. 27,422.)*Ceratichtys biguttatus*, COPE, Trans. Amer. Phil. Soc. 1869, 366.

A few immature individuals from the Chickasawha River at Enterprise.

45. *Ceratichtys amblops* (Raf.) C. & J. (No. 27,436.)*Ceratichtys amblops*, JORDAN, Annals N. Y. Lyc. Nat. Hist. 1877, 328.

An individual of this species, having a total length of five inches, and differing in no important respect from a specimen of the same size caught in Indiana, has been sent to me by Mr. Warner.

46. *Ceratichtys winchelli* (Grd.) Jor.*Hybopsis winchelli*, GIRARD, Proc. Acad. Nat. Sci. Phila. 1856, 211.*Ceratichtys hyalinus*, COPE, Journ. Acad. Nat. Sci. Phila. 1869, 226.*Nocomis winchelli*, JORDAN, Annals N. Y. Lyc. Nat. Hist., 1877, 330.A single specimen of a fish answering well enough to the descriptions of this species was obtained at Enterprise. It is probably but a variety of *C. amblops*.

The dark lateral band is very decided the whole length of the body. It is continued from the front of the eye around the snout, and is here quite black.

## FAMILY CATOSTOMIDÆ.

## GENUS MOXOSTOMA, Rafinesque.

47. *Moxostoma macrolepidotum* (Le Sueur) Jordan, var. *duquesnii*.*Catostomus duquesnii*, DEKAY, Fauna N. Y. Fishes, 203.*Teretulus duquesnii*, COPE, Journ. Acad. Nat. Sci. Phila. 1869, 236.*Ptychostomus duquesnii*, COPE, Proc. Amer. Phil. Soc. 1870, 476.*Myxostoma macrolepidotum*, subsp. *duquesnii*, JORDAN, Bull. U. S. Nat. Mus. No. 12, 120.

Several individuals of the widely spread "Red Horse" were obtained at Enterprise.

48. *Moxostoma pæcilurum*, Jordan. (No. 27,463.)

One specimen from Enterprise.



GENUS ERIMYZON, Jordan.

49. *Erimyzon sucetta* (Lac.) Jordan. (No. 27,448.)

*Catostomus sucetta*, DEKAY, Fauna N. Y. Fishes, 203.

*Moxostoma clariformis*, GIRARD, Pac. R. R. Surv. vol. x, 219.

*Erimyzon sucetta*, JORDAN, Bull. U. S. Nat. Mus. No. 12, 144.

A specimen of this species, a female, was obtained at Corinth. Another female was caught in a shallow branch of Catawba Creek whilst depositing her spawn, in company with the male. Another very young specimen was seined at Macon.

GENUS CATOSTOMUS, Le Sueur.

50. *Catostomus nigricans*, Le Sueur. (No. 27,447.)

*Hypentelium nigricans*, JORDAN, Bull. U. S. Nat. Mus. No. 9, 34.

*Catostomus nigricans*, JORDAN, Bull. U. S. Nat. Mus. No. 10, 162.

One specimen from Enterprise.

FAMILY SILURIDÆ.

GENUS ICTALURUS, Rafinesque.

51. *Ictalurus punctatus* (Raf.) Jordan. (No. 27,448.)

*Ictalurus caruleus*, COPE, Proc. Amer. Phil. Soc. 1870, 489.

*Pimolodus olivaceus*, GIRARD, Pac. R. R. Surv. vol. x, 211.

*Ichthylurus punctatus*, JORDAN, Bull. U. S. Nat. Mus. No. 10, 76.

I obtained specimens of this Catfish from the Noxubee River at Macon; others have since been sent me from Enterprise, on the Chickasawha, by Mr. Warner.

GENUS AMIURUS, Rafinesque.

52. *Amiurus vulgaris* (Thomp.) Nelson. (No. 27,437.)

*Pimolodus ailurus*, GIRARD, Pac. R. R. Surv. vol. x, 210.

*Amiurus vulgaris* subsp. *ailurus*, JORDAN, Bull. U. S. Nat. Mus. No. 10, 88.

Two Catfishes were purchased from a young negro, who had caught them in Sand Creek near Artesia. One of these, having a total length of 10 inches, I identify as above. It is, I have no doubt, Girard's *P. ailurus*, and if this is, as Professor Jordan in his "Synopsis of the Fresh Water Siluridæ of the United States" affirms, identical with Thompson's *P. vulgaris*, the latter name will be the proper one to employ.

The discovery of this specimen reveals a much greater range southward in this species than was previously suspected. Hitherto it has not been known to occur further south than Saint Louis, and has been supposed to be peculiar to our northern lakes and rivers.

The other Catfish purchased was—

53. *Amiurus melas* (Raf.) Jord. & Copeland. (No. 27,462.)

*Amiurus melas*, JORDAN, Bull. U. S. Nat. Mus. No. 10, 89.

One specimen from Sand Creek, Artesia, and two from Noxubee River at Macon.

## GENUS PILODICTIS, Rafinesque.

54. *Pilodictis olivaris* (Raf.) Gill. & Jor.

*Hoplademus olivaris*, GILL, Proc. Bost. Soc. Nat. Hist. 1862, 45.—COPE, Journ. Acad. Nat. Sci. Phila. 1869, 237.

*Pelodichthys olivaris*, JORDAN, Bull. U. S. Nat. Mus. No. 10, 95.

The skin of a fine specimen of this species was obtained at Shubuta, the fish having been hooked from a branch of the Chickasawha.

## GENUS NOTURUS, Rafinesque.

55. *Noturus leptacanthus* ? Jordan. (No. 27,442.)

*Noturus leptacanthus*, JORDAN, Annals N. Y. Lyc. Nat. Hist. 1877, 352; Bull. U. S. Nat. Mus. No. 10, 102.

I have in my collection a specimen of a *Noturus* which agrees pretty well with the descriptions given by Professor Jordan of his *N. leptacanthus*, as above cited. There are, however, some important differences which I am not able to account for satisfactorily. My specimen is not quite 2 inches long to the base of the caudal, and is, therefore, most probably a young one. Hence, the differences noted below may be due either to its being immature or to its being a different species. It seems that Professor Jordan knew of but a single specimen, and therefore his description may not be applicable to every individual belonging to the species.\*

The head is small and narrow, widening gradually from the narrow snout to the shoulders; the lateral outlines of the head, therefore, straight; its length  $4\frac{1}{2}$  times in the body. Upper jaw projecting, *spines rather long and slender*, instead of being short as in the type, the pectoral spine being one-half the length of the head. *The color is quite dark.*

In other respects the characters assigned by Professor Jordan to his species apply reasonably well to my specimen. I think, therefore, that until more material is collected it will be better to assign the specimen as above.

Collected at Enterprise.

56. *Noturus gyrinus* (Mitchill) Raf.

*Noturus gyrinus*, COPE, Journ. Acad. Nat. Sci. Phila. 1869, 237.—JORDAN, Bull. U. S. Nat. Mus. No. 10, 102.

Another *Noturus*, 2 inches long, collected at Macon, belongs to the above species.

I append the following list of species collected at each of the localities visited:

## 1. CORINTH. Water flowing toward the Mississippi.

- |                                   |                                     |
|-----------------------------------|-------------------------------------|
| 1. <i>Vaillantia chlorosoma</i> . | 5. <i>Luxilus cornutus</i> .        |
| 2. <i>Microperea praeliaria</i> . | 6. <i>Minnilus punctulatus</i> .    |
| 3. <i>Zygonecetes notatus</i> .   | 7. <i>Notemigonus chrysolenus</i> . |
| 4. <i>Hyborhynchus notatus</i> .  | 8. <i>Erimyzon sucetta</i> .        |

\* Professor Jordan informs me that he has additional specimens of his *N. leptacanthus*, in all of which the spines are short, less than one-third the length of the head. The skin, however, is said to be dark, as in my specimen.

2. ARTESIA. Catawba Creek, into Tombigbee.

- |                                  |                                      |
|----------------------------------|--------------------------------------|
| 1. <i>Pœciliichthys artesiæ.</i> | 9. <i>Opsopœodus emiliæ.</i>         |
| 2. <i>Vaillantia chlorosoma.</i> | 10. <i>Minnilus bellus.</i>          |
| 3. <i>Micropterus pallidus.</i>  | 11. <i>Semotilus corporalis.</i>     |
| 4. <i>Apomotis cyanellus.</i>    | 12. <i>Notemigonus chrysoleucus.</i> |
| 5. <i>Lepomis pallidus.</i>      | 13. <i>Erimyzon sucetta.</i>         |
| 6. <i>Zygonectes melanops.</i>   | 14. <i>Amiurus vulgaris.</i>         |
| 7. <i>Zygonectes notatus.</i>    | 15. <i>Amiurus melas.</i>            |
| 8. <i>Hyborhynchus notatus.</i>  |                                      |

3. MACON. Noxubee River, into Tombigbee.

- |                                   |                                     |
|-----------------------------------|-------------------------------------|
| 1. <i>Boleosoma maculatum.</i>    | 11. <i>Dorosoma cepedianum.</i>     |
| 2. <i>Vaillantia chlorosoma.</i>  | 12. <i>Hyborhynchus notatus.</i>    |
| 3. <i>Apomotis cyanellus.</i>     | 13. <i>Hybognathus argyritis.</i>   |
| 4. <i>Lepomis pallidus.</i>       | 14. <i>Opsopœodus emiliæ.</i>       |
| 5. <i>Pomoxys nigromaculatus.</i> | 15. <i>Minnilus bellus.</i>         |
| 6. <i>Pomoxys annularis.</i>      | 16. <i>Notemigonus chrysolenus.</i> |
| 7. <i>Elassoma zonatum.</i>       | 17. <i>Erimyzon sucetta.</i>        |
| 8. <i>Aphredoderus sayanus.</i>   | 18. <i>Ictalurus punctatus.</i>     |
| 9. <i>Zygonectes melanops.</i>    | 19. <i>Amiurus melas.</i>           |
| 10. <i>Zygonectes notatus.</i>    | 20. <i>Noturus gyrinus.</i>         |

4. NARKEETA. Sucharnochee River, into Tombigbee.

- |                             |                                    |
|-----------------------------|------------------------------------|
| 1. <i>Lepomis obscurus.</i> | 2. <i>Centrarchus macropterus.</i> |
|-----------------------------|------------------------------------|

5. ENTERPRISE. Chickasawha River.

- |                                     |                                      |
|-------------------------------------|--------------------------------------|
| 1. <i>Ammocrypta gelida.</i>        | 18. <i>Alburnops xænocephalus.</i>   |
| 2. <i>Percina caprodes.</i>         | 19. <i>Hemitremia maculata.</i>      |
| 3. <i>Hadropterus spillmani.</i>    | 20. <i>Luxilus cornutus.</i>         |
| 4. <i>Nanostoma elegans.</i>        | 21. <i>Luxilus chickasavensis.</i>   |
| 5. <i>Nanostoma zonale.</i>         | 22. <i>Ericymba buccata.</i>         |
| 6. <i>Pœciliichthys saxatilis.</i>  | 23. <i>Opsopœodus emiliæ.</i>        |
| 7. <i>Micropterus pallidus.</i>     | 24. <i>Minnilus dilectus.</i>        |
| 8. <i>Ambloplites rupestris.</i>    | 25. <i>Minnilus rubripinnis.</i>     |
| 9. <i>Chænobryttus gulosus.</i>     | 26. <i>Ceratichthys biguttatus.</i>  |
| 10. <i>Lepomis pallidus.</i>        | 27. <i>Ceratichthys amblops.</i>     |
| 11. <i>Lepomis fallax.</i>          | 28. <i>Ceratichthys winchelli.</i>   |
| 12. <i>Zygonectes notatus.</i>      | 29. <i>Moxostoma macrolepidotum.</i> |
| 13. <i>Hyodon selenops.</i>         | 30. <i>Moxostoma pœcilurum.</i>      |
| 14. <i>Clupea chrysochloris.</i>    | 31. <i>Catostomus nigricans.</i>     |
| 15. <i>Hybognathus argyritis.</i>   | 32. <i>Ictalurus punctatus.</i>      |
| 16. <i>Alburnops taurocephalus.</i> | 33. <i>Noturus leptacanthus</i> †    |
| 17. <i>Alburnops longirostris.</i>  |                                      |

6. SHUBUTA. Chickasawha River.

1. *Pilodietis olivaris.*

## SYNOPSIS AND DESCRIPTIONS OF THE AMERICAN RHINOBATIDÆ.

By SAMUEL GARMAN.

## RHINOBATIDÆ.

Trunk broad, flat; tail long, strong, continuous with the body; dorsals and caudal well developed; pectorals not reaching the end of the snout (except species of *Discobatidae*); covered with shagreen; with spines in a vertebral row and on the shoulders; generally viviparous.

## RHINOBATUS.

- Nasal valves not extended upon the space between the nostrils;  
 two folds on the spiracle; rostral cartilage  
   medium, the ridges  
     separate;  
       snout pointed.....*leucorhynchus*  
     confluent half their length;  
       snout rounded on the end.....*productus*  
 produced, narrow; groove short, small; ridges  
     confluent more than half their length.....*spinosus*  
 long; ridges straight, confluent  
     less than half their length;  
       four patches of spines on the shoulders;  
         color uniform.....*horkelii*  
     more than half their length;  
       two patches of spines on shoulders;  
         clouded or blotched.....*undulatus*  
     close together, narrowly separated at the base;  
       rarely with spines on the shoulders;  
         freckled with whitish.....*lentiginosus*  
 one fold on the spiracle; snout blunt, rounded;  
   head flat.....*planiceps*

## SYRRHINA.

- Nasal valves extended on the internarial space;  
 a fold on the hinder margin of the spiracle;  
   rostral ridges meeting.....*brevirostris*  
 no fold on the spiracle;  
   rostral ridges not meeting.....*exasperata*

## PLATYRHINOIDIS.

- Labial fold distinct;  
 no fold on the spiracle;  
   posterior lobe of nasal valve rudimentary.....*triseriata*

## RHINOBATUS.

Rostral cartilage rather slender, pointed, ridges meeting or close together in front; dorsal fins far behind the ventrals; nasal valves not extending between the nostrils; disk, without the ventrals, subtriangular; claspers slender, pointed.

**Rhinobatus leucorhynchus.**

Günther, 1866, Proc. Zool. Soc. Lond. 604.

Length of disk, including ventrals,  $11\frac{1}{2}$ , width  $7\frac{3}{4}$ , snout from mouth to tip  $3\frac{3}{4}$ , and total length 23 inches. Anterior margins very slightly undulating, posterior broadly curved. Posterior margin of ventral nearly straight. Head moderately broad, slightly concave; width between the eyes three and one-half times in the length of the snout. Rostral cartilage strong, moderately long; ridges separate in their entire length, approaching each other regularly toward the end of the snout, which they do not reach. Tip of the snout more pointed than in other species. Eyes moderate, larger than the spiracle. Spiracle with two folds on its posterior border. Anterior nasal valve small, not dilated, extending over little more than half the length of the nostril. Mouth slightly arched in the middle.

Body covered with shagreen above and below. A row of small spines along the vertebræ, a pair on each shoulder, one above each eye, and a row of smaller ones along the orbital ridges. Tail depressed, with a fold on each side. Dorsals equal, second distant from the caudal the length of its base, and from the first by the length of its anterior border.

Light reddish or olivaceous brown. Translucent spaces in front of the head white. White beneath.

Panama.

**Rhinobatus productus.**

Girard, 1854, Proc. Acad. Nat. Sci. Phila. 196.

Disk having the form of that of *planiceps*. Snout shorter than that of *undulatus*, rounded at the end. Rostral ridges confluent half or more of their length. Head slightly concave between the orbital ridges. Spiracles with two folds on the posterior border. Fins as in *planiceps*. Young with a dorsal row of compressed hooked spines commencing immediately behind the head, a pair on each shoulder, a series of smaller ones in front and above each eye, and a row of small ones on each of the ridges of the rostrum.

Color a clouded brown, white on the translucent spaces in front of the head, a black spot beneath the end of the snout. The brown is grayish and somewhat dull, rather than rich and dark, as in the flat-headed species. Large specimens have small, indistinct spines in dorsal and orbital series, rostral ridges confluent for a greater portion of their length, and uniform coloration. Distinguished from *R. planiceps* by the folds on the spiracle, confluence of the ridges, and color; from *R. undu-*



*latus* by the stoutness of body, shortness of snout, and color. Thirty-eight specimens were collected at San Diego, Cal., by the Hassler expedition.

***Rhinobatus spinosus.***

Günther, 1870, Cat. Fish. Brit. Mus. viii, 518.

\* Anterior nasal valve not dilated laterally. Snout much produced, the distance between the outer angles of the nostrils being one-half of that between the mouth and the end of the snout. The rostral ridges are confluent, very narrow, with a very small and short groove at the base, and in their entire length provided with spines. Mouth nearly straight. Compressed spines with dilated base along the median line of the back, on the shoulder, and above the eye and spiracle; the entire upper surface rough. Snout white. (Günther.)

Mexico.

***Rhinobatus horkelii.***

Müller & Henle, 1841, Syst. Besch. Plagiost. 122.

Rhombic. Disk, including ventrals, 19, width 11.62, tip of snout to mouth, 6.87, and total length 35.5 inches. Head broader than that of *R. undulatus*; crown flat. Anterior margins slightly sinuous. Angles and posterior margins of pectorals broadly rounded. Margins of ventrals nearly straight. Snout long, rather less than four times the width of the head between the eyes. Rostral cartilage strong; ridges distant at base, close together somewhat less than half their length, expanded near the extremity. Eye smaller than the spiracle. Spiracle with two folds on the posterior border. Anterior nasal valve not dilated, not extending half the length of the nostril. Mouth nearly straight; a pair of concave curves meet to form a low arch on the symphysis. Covered with shagreen above and below. A row of hooked spines along the vertebræ, a row of several near the middle of each half of the shoulder-girdle, and a few smaller ones on the orbital ridge and in a group upon the end of the snout. Tail depressed, with a fold on each side. Second dorsal distant from the caudal less than the length of its base, and from the first less than the length of its anterior border.

Uniform light grayish or olivaceous brown, without cloudings or spots. Whitish below. Translucent spaces on the snout white in young, darker in old. Sometimes a small patch of brown under the tip of the snout.

Bahia; Rio Grande; Rio Janeiro and northward.

***Rhinobatus undulatus.***

v. Olfers, 1831, Die Gattung Torpedo, 22.

Rhombic. Disk, including ventrals, 18, width 10.75, from tip of snout to mouth 5.75, and total length 33 inches. Anterior margins nearly straight, slightly concave. Angles and posterior margins of pectorals broadly rounded. Posterior margin of ventral straight a portion of its length; posterior angle blunt. Head moderate; crown concave.

Snout long, about four and one-half times the width of the head between the eyes. Rostral cartilages narrow, ridges close together more than half their length, expanded near the extremity. Eye moderate, larger than the spiracle. Spiracle with two tubercles on the hinder margin. Anterior nasal valve not dilated, extending over little more than half of the length of the nostril. Mouth straight or slightly arched forward. Covered with shagreen above and below. A row of small spines in a vertebral series to the caudal, a row of several near the middle of each half of the shoulder-girdle, and several above each eye and spiracle. No spines on the snout. Tail depressed, with a fold on each side. Second dorsal distant from the caudal more than the length of its base, and from the first by the length of its anterior border.

Claspers long, slender, but little swollen at the end.

Olivaceous brown, transversely clouded with darker. A few small round spots of white above the gills and behind the shoulder-girdle. Translucent spaces of snout white; below there is a lozenge-shaped spot of dark, from each side of which a dark line passes to the anterior rays of the pectorals. Old specimens more uniform in color; dark marks of snout sometimes faded.

Rio Janeiro and southward.

#### *Rhinobatus lentiginosus.*

Garman, 1880, Bull. Mus. Comp. Zool. 163.

Outlines of body and fins similar to those of *horkelii* and *undulatus*. Rostral cartilage long and narrow, a small groove near the head; ridges close together from base to extremity. Eyes large. Spiracles half as large as the eyes, with two folds. Head narrow, concave between the eyes. The width of the interocular space equals that of the nostrils or their distance apart. Half the length of the snout is less than the distance between the outer angles of the nostrils. Mouth nearly straight, a little less than twice the width of the head between the eyes. Scales small, smooth. Spines of the dorsal series and the three in front of each eye very small; those above the eye and spiracle not noticeable. The largest spines on the body are a group of five on the top of the end of the snout, a pair of which resemble small horns. Shoulders smooth or with a single small spine.

Color a light grayish brown, densely freckled with small spots of lighter; uniform brownish below. On the lower side of the snout there are faint indications of markings similar to those of *undulatus*.

Distinguished from *horkelii* and *undulatus* by the colors, the horn-like spines on the end of the snout, the absence of spines on the shoulders, the narrowness of the head as compared with the width of the mouth, the shorter distance from snout to mouth, and the greater distance from mouth to vent. Total length 22.9, snout to mouth 4.1, snout to vent 9.9, and width of pectorals 7.4 inches.

Florida; South Carolina.

**Rhinobatus planiceps.**

Garman, 1880, Bull. Mns. Comp. Zool. No. 11, 168.

Disk, including ventrals, rhombic, about one and a half times as long as wide. Anterior borders of pectorals straight, more than twice as long as the convex posterior margins. Angles of pectorals rounded, the hinder not extending farther than to the vent. Outer angle of ventrals rounded, posterior acute. Head broad, flat. Rostral cartilage medium, dilated at the extremity, with the ridges close together in the anterior third of their length. Snout rather broad, with rounded extremity. Eyes moderate. Spiracle immediately behind the eye, smaller than the orbit, with a single fold on the posterior side. Anterior nasal valve not dilated, posterior two-lobed. Mouth nearly straight. Body covered with shagreen above and below. Tail appearing as if continued on the posterior portion of the abdomen, much depressed, with a fold on each side, bearing two elevated dorsals behind the ventrals and a caudal with convex border at its extremity. Second dorsal distant from the caudal the length of its base. Bases of the dorsals distant from each other the length of the anterior borders. Scales larger over the central portions of the disk. Compressed hooked spines in a median row on back and tail, in two patches on each shoulder, and a series above each eye. On the young these spines are much more prominent and regular in size than in the adult. Color brown; light between and on each side of the rostral ridges; white below. Young specimens with a number of small, round, white spots on each side of the dorsum.

The following measurements are taken from a young male:

	Inches.
Total length .....	19.0
Snout to end of ventrals.....	10.2
Snout to mouth .....	3.5
Width of pectorals .....	6.9

Payta, Callao, and Galapagos Islands.

**SYRRHINA.**

Characters in general those of *Rhinobatus*. Disk somewhat shorter and broader. Nasal valves dilated and extending upon the internarial space.

**Syrrhina brevirostris.**

Müller &amp; Henle, 1841, Syst. Besch. Plagiost. 114.

Disk, including the ventrals, rhombic, longer than wide; width about seven-eighths of the length. Anterior margins nearly straight, slightly indented opposite the gill-openings, at the end of the snout forming an angle of less than ninety degrees. Angles and posterior margins of pectorals rounded. Ventrals rounded. Posterior angle rather blunt. Head moderate; crown concave. Snout short, slightly rounded at the tip; length about twice the width of the head between the eyes. Rostral ridges distant at the head, meeting at the end of the rostrum. Eye

moderate, rather larger than the spiracle. Spiracle with one tubercle on the hinder margin. Anterior nasal valves dilated, extending across about one-third of the space between the nostrils. Mouth arching forward slightly. Body rough with shagreen above and below. Small hooked spines scattered over back and tail. A row of tubercular spines along the vertebrae to the second dorsal. Two or three similar tubercles over each extremity of the shoulder-girdle and a pair a short distance from these toward the vertebral row. A couple of spines above each spiracle and one or two in front of each eye. Tail depressed, with a fold on each side. Dorsals equal, second distant from the caudal the length of its base and from the first the length of its anterior border.

Light grayish or olivaceous brown; margins lighter; whitish below. Sometimes clouded with brown.

The claspers, as far as may be judged from young specimens, are similar to those of *R. undulatus*.

Total length  $18\frac{1}{2}$ , length of disk, including ventrals, 10, and width of disk  $8\frac{3}{4}$  inches.

Rio Janeiro.

#### *Syrrhina exasperata*.

Jord. & Gilb. 1880, Proc. U. S. Nat. Mus. 32.

Disk, including the ventrals, rhombic, longer than wide. Anterior borders of pectorals nearly straight; posterior convex. Snout truncated, as wide on the end as the space between the eyes. Rostral cartilage wide and strong, deeply grooved on its upper surface. Rostral ridges prominent, widely separated, nearly or quite parallel from base to extremity. Spiracles large, equal in diameter to the orbit, without a fold on the side. Fin-angles rounded, except the obtuse posterior angles of the dorsals. Dorsals elevated, behind the ventrals, the length of the base of the first less than the length of its posterior border, base of the second equal to its posterior margin. The base of the first is equal to its distance from ventral or from second dorsal. Anterior nasal valves dilated, continued a little beyond the inner angles of the nostrils; posterior two-lobed. Anterior extremities of the pectorals widely separated from the rostral cartilage, extending very little in advance of the eyes. Mouth wide, forming a low arch, regularly curved from the corners. Labial fold distinct for a short distance at the symphysis. Teeth small, blunt, in a hundred and ten series in the upper jaw. Claspers long, slender, knobbed at the ends. Tail with a thick fold on each side; caudal fin rounded, without indentation. Back thickly covered with small scales, among which are scattered larger ones. A median row of large, blunt tubercles on the back and tail, and two short rows parallel to this on each shoulder. The bases of the tubercles are so covered by the skin and small scales that they appear as rounded prominences with a small spine on the summit.

Color grayish brown. Near the ends of the rostral ridges there is a



band of dark brown; between this and another dark band which crosses the bases of the ridges there is a light band. A dark band across the head between the eyes is somewhat confluent with the band in front of it, which makes the fore part of the head dark, but leaves the prominences in front of the eyes light colored. The remainder of the upper surface is more or less clouded by faint indications of transverse bands. These are more distinct in the young. With the exception of a dark spot on the posterior angle of each pectoral, the lower surface is white.

Total length 33.4, snout to end of ventrals 18, snout to mouth 4.1, and width of disk 15.5 inches. Specimen described an adult male. The kindness of the officers of the National Museum has enabled me to satisfy myself of the identity of *Trigonorhina alveata*, described from old, and *Platyrrhina exasperata*, from very young specimens.

Southern California.

#### PLATYRRHINOIDIS, gen. nov.

Disk broad, flat, rounded. Tail moderate, depressed, caudal fin broad. Dorsals posterior. Tubercular spines in vertebral series and on anterior margins of pectorals. Labial fold well developed. Nasal valves not reaching the mouth, posterior lobe rudimentary. Viviparous.

Distinguished from *Syrrhina* and *Trigonorhina* by the labial fold, nasal valves, and marginal series of spines, and from *Platyrrhina* by the fold, valves, separation of pectorals, and viviparity.

#### *Platyrrhinoïdis triseriata*.

Jord. & Gillb., 1880, Proc. U. S. Nat. Mus. 36.

Disk, including ventrals, subrhomboid, a little longer than broad, anterior borders convex, anterior and lateral extremities forming broad curves. Snout broad, rounded in front, length from upper jaw equal to distance between outer borders of nostrils. Rostral cartilage stout, ridges approaching rapidly and meeting near the end to form an acute point. Spiracles moderate, larger than the eyes and close behind them, without folds on the sides. Eyes small, distant from the end of the snout one and one-fourth times the distance between the spiracles. Crown broad, concave. Nostrils broad, narrower than the distance between, which is nearly four times the space between them and the mouth. Nasal valves medium, hardly reaching upon the space between the nostrils, outer lobe narrow, posterior rudimentary. Mouth not large, moderately curved, distant from the end of the snout about one and one-third times its width. Teeth small (82 series in the upper jaw of the adult female described), subhexangular on the base, smooth or with a low, blunt cusp. Pectorals separated from the rostral cartilage by a translucent space. Dorsals similar, longer than high, separated by one and one-half times the length of their bases, insertion of anterior a little in advance of the middle of the tail, posterior reaching a little behind the insertion of the caudal. Tail strong, more distinct from body than



in species of *Syrrhina*, length from vent little more than that from snout to extremity of ventrals, with a broad cutaneous fold on each side below, which extends to the ventrals and is continuous with the lower lobe of the caudal. Caudal rather large, somewhat more than twice as long as wide, margins entire. Covered with shagreen above and below. Several (three to four) series of sharp, erect, immovable spines along the anterior margin of the pectoral, a group of several above the extremity of the rostral cartilage, and several on the orbital ridge. A vertebral series of larger spines on back and tail extending to the second dorsal, a pair near the middle and on each end of each branch of the shoulder girdle, and a series on each side of the upper surface of the tail parallel with the median.

In foetal specimens the lateral series on the tail are not developed, and the inner pairs on the shoulder-girdle are represented by single spines. The upper portion of each spine is long, narrow, subfusiform, depressed, and, resting upon a low, narrow support, appears as if merely applied to the skin by a portion of its lower side.

Disk to end of ventrals 12, width of disk 11.2, vent to end of tail 12.6, and total length 22 inches.

Uniform olivaceous brown, whitish beneath.

Specimens described from U. S. Nat. Museum. Hab. Southern California.

#### DISCOBATIDÆ, fam. nov.

Form intermediate between that of the *Rajidæ* and *Rhinobatidæ*; nearer the latter. Tail less distinct from the body than in the former, to which there is also less similarity in dorsals, ventrals, caudal, and nasal valves. Oviparous. Provisionally placed as a subfamily of the *Rhinobatidæ*.

#### DISCOBATUS.

##### *Platyrrhina*, preoccupied.

Disk broad, flat, subcircular. Pectorals approximating in front of the head. Ventrals separate, entire. Dorsals and caudal as in *Syrrhina*. Nasal valves resembling those of the *Rhinobatidæ*; anterior lobes united across the internarial space. Egg-cases similar to those of certain *Scylliidæ*.

*D. schönleinii*, sp. Müller & Henle, India.

*D. sinensis*, sp. Lacépède, China.

The species recently described as *Platyrrhina* having been withdrawn, the genus contains no American representatives at present.

LIST OF THE NORTH AMERICAN SPECIES OF MYRIAPODS BELONGING TO THE FAMILY OF THE LYSIOPETALIDÆ, WITH A DESCRIPTION OF A BLEND FORM FROM LURAY CAVE, VIRGINIA.

By JOHN A. RYDER.

Without specimens of each of the species identified by the authors who have described them, the writer finds himself quite unable to make a greatly needed revision of this group. The sexual appendages have not been described in *Spirostrephon cæcioannulatus* Wood, *S. copei* Packard, or ?*S. rudii* and *S. cavernarum* Cope. In the cases of the two last, Professor Cope, who described them in 1869, at first thought that they were provided with two pairs of lateral pores to each segment, and in the belief that *Spirostrephon* had no lateral pores he proposed the genus *Pseudotremia*. He afterwards seemed to agree with Packard that the last-named genus was not valid, and appears to have considered the *P. cavernarum* a *Spirostrephon*, as he adopts the last name as its genus in his paper on the Wyandotte Cave fauna, which he published in the American Naturalist in July, 1872. His principal reasons for this step seem to have been the foregoing, and that the species was not hairy and was furnished with well-developed triangular eye-patches. "The allied form found by Mr. Cooke in the Mammoth Cave has been described by Dr. Packard as *Spirostrephon copei*." And, Professor Cope continues, "It is eyeless, and is, on this account alone, worthy of being distinguished generically from *Spirostrephon*, though the absence of pores, asserted by Dr. Packard, would also constitute another character. *Spirostrephon* possesses a series of lateral pores, as I have pointed out in accordance with Wood's view." At this point Professor Cope refers to a paper by himself in the Proceedings of the American Entomological Society for 1870, where, in a foot-note, he says: "I must correct my character 'no lateral pores' for *Spirostrephon* (Proc. Am. Phil. Soc., 1869, p. 179) to one series of pores." He then proposes the genus *Scoterpes* for Packard's *Spirostrephon copei*. We are accordingly led to believe that he has abandoned the genus *Pseudotremia*. But when we come to learn the character of the external generative organs of the forms described by both Cope and Packard, I would be greatly disappointed if it was not found necessary to separate *S. cavernarum*, ?*S. rudii*, and *S. cæcioannulatus* Wood from *Spirostrephon* and refer them to another genus. For it is a very singular fact that, out of eight species of *Lysiopetalidæ* which have been described since the *S. lactarius* of Say, none are known to have more than 32 or less than 28 segments, while the type species has no less than 59, according to Wood. I am therefore inclined to believe with Cope that the *S. cæcioannulatus* is congeneric with *S. cavernarum* and *S. rudii*, for which the name *Pseudotremia* would perhaps become available in case they should be found to be dis-

tinct. Not only do the segments of *S. lactarius* greatly exceed in number those of the curious little Lysiopetalids now under discussion, but the secretion from the *foramina repugnatoria* of the former must be copious, for Say remarks that "when irritated it discharges a lacteous globule from the lateral portion of each segment, diffusing a strong and disagreeable odor". And Cope remarks (Proc. Am. Ent. Soc., 1870, p. 67) that "*Spirostrephon lactarius* exudes from a series of lateral pores a fluid which has in its odor a strong resemblance to creosote". Whether the genus *Scoterpes* is well enough characterized by the absence of eyes may be a matter of opinion; otherwise the form agrees too closely with *Trichopetalum* to warrant us in being certain that it is not closely related. Both *S. (Scoterpes) copei* and the three known species of *Trichopetalum* have no lateral pores, according to their describers, and are therefore probably a pretty closely related group, especially since they closely agree in the number of segments and the arrangement of the hairs or bristles on the back. The figure given by Packard (Am. Naturalist, v, 1871, p. 749) does not enable one to decide if it is male or female, on account of the carelessness of the artist with the first five pairs of legs, though it appears as if it were a female. Moreover, in the figure of the head from the front he contradicts his description on page 748, where he says: "No ocular depression behind the antennæ, the surface of the epicranium being well rounded to the antennal sockets." The figure 130 a, on page 749, would fairly represent the front of the head of the species which I shall describe farther on, only that the antennæ are relatively longer in Dr. Packard's species.

Taking a retrospective glance at the genera of American *Lysiopetalidæ*, we find that a single species has furnished the basis for the genus *Spirostrephon*, defined by J. F. Brandt, in 1841, in his *Recueil*. His description is only comparative with other groups of *Julidæ* of equal rank; the family character of the Lysiopetalids (sterna rudimentary, not conjoined with senta) was used by him to define the genus *Lysiopetalum*. In this way *Spirostrephon* was characterized, mainly with respect to the characters presented by the maxillo-labial elements. Can it be considered safe, in view of the facts before us, to indiscriminately assign species to a genus which has been quietly embraced amongst the ill-defined forms which have been discovered since the family has been founded? To the writer the answer seems to be in the negative. No reference to the characters assigned to the genus or the description of the typical species of *Spirostrephon* has been made by some of the authors of American species of *Lysiopetalidæ*. The present systematic condition of the group is not good, and we are reluctantly forced to admit that it is very little better than a mere list of names. While the intention is not to belittle any one, there has been a very manifest lack of definiteness as well as accuracy and completeness of the descriptions. From the description of *S. cavernarum*, ? *S. rudii*, and *S. copei*, we would be led to infer that the antennæ were 8-jointed, but when we observe Dr. Pack-

ard's figure of the last species (Am. Nat., v, p. 749) we find that there are but seven joints represented, which is in agreement with what we find in *Trichopetalum*, *Zygonopus*, *Craspedosoma*, and *Lysiopetalum*; and in the case of the two first, Professor Cope's virtual assignment of them to *Spirostrephon* makes the number of joints in their antennæ doubtful. *Trichopetalum* Harger, might probably have been more closely defined as to its generic characters, since those given by its author would not define it from *Zygonopus*, and it differs only from *S. (S.) copei* in having eyes, from *Craspedosoma* in having free sterna, though the latter may have free sterna too. Mr. Harger, however, admits the difficulties which beset him, at page 119, in a foot-note (Am. Jour. Sci., iv, 1872).

While examining some living specimens of *Trichopetalum lunatum* under the microscope, about a year since, I observed that the respiration of the animal appeared to be conducted in a most singular manner. The air seemed to be drawn in under the labrum and in some way to enter the dorsal cardiac sinus as bubbles, which could be traced for some distance, more than half the length of the animal, as they traveled slowly backwards, until they disappeared over the opaque mass of ingested food contained in the intestine. These bubbles of air always passed backwards. It may have been that they passed backwards inside of the intestine, but the impression I got was that they were traveling through the cardiac sinus or dorsal heart of the animal. This circumstance may explain why it is that there are no pores on the side of the body, though it is true that the lateral pores of millipeds are usually foramina repugnatoria, and have nothing to do with the trachea or respiratory apparatus. This raises the question whether our *Lysiopetalidae* are not distinguished from other forms in some more important way than has been hitherto supposed.

The species which have been described are the following, though it is to be understood that they are only given as a list for reference; no arrangement is yet possible and none is attempted:

1. SPIROSTREPHON LACTARIUS Say, Wood (Trans. Am. Phil. Soc., n. s., xiii), Art. Myriap. of N. Am., p. 192, with synonymy; Cope, Proc. Am. Phil. Soc., xi, p. 179.

*Habitat*.—Eastern United States.

2. S. CÆSIOANNULATUS Wood, op. cit., p. 194.

*Habitat*.—Allegheny County, Pennsylvania.

Length 1 inch.

3. PSEUDOTREMIA CAVERNARUM Cope, Proc. Am. Phil. Soc., xi, p. 179, 1869; Cope, Proc. Am. Ent. Soc., iii, p. 67, 1870; Packard, Am. Nat., v, p. 749, 1871.—*Spirostrephon cavernarum* Cope, Am. Nat., vi, p. 414, 1872.—*P. cavernarum* Harger, Am. Jour. Sci., iv, pp. 118, 119, 1872.

*Habitat*.—Caverns in Virginia and Indiana.

Length 11 lines.



4. *PS. VUDII* Cope, loc. cit., p. 180; Packard, *Am. Nat.*, v, pp. 748, 749, 1871; Harger, loc. cit., pp. 118, 119.

*Habitat*.—?Montgomery County, Virginia.

Length 11 lines.

5. *SPIROSTREPHON* (*PSEUDOTREMIA*) *COPEI* Packard, *Am. Nat.*, v, pp. 748, 749, 1871.—*Scoterpes copei* Cope, *Am. Nat.*, vi, p. 409, genus *Scoterpes* proposed and defined p. 414; Harger, loc. cit., pp. 118, 119; Packard, *Zoology*, pp. 356, 357.

*Habitat*.—Mammoth Cave, Kentucky.

Length .35 inch.

*TRICHOPETALUM* Harger, *Am. Jour. Sci.*, iv, p. 118, pl. ii, 1872.

6. *T. LUNATUM* Harger, loc. cit., p. 119; Ryder, *Am. Nat.*, xiv, p. 376, 1880.

*Habitat*.—New Haven, Conn., and Philadelphia, Pa.

Length 6<sup>mm</sup>.

7. *T. GLOMERATUM* Harger, loc. cit., p. 120.

*Habitat*.—John Day River, Oregon.

Length 10<sup>mm</sup>.

8. *T. JULOIDES* Harger, loc. cit., p. 120.

*Habitat*.—Simmons' Harbor, north shore Lake Superior. (Smith.)

Length 8<sup>mm</sup>.

The ninth American species, described below, is the third form of *Lysipetalid* which is known to inhabit caves, and the only one beside the species which stands fifth in the above list which is totally blind. I name the species for Dr. C. A. White, United States paleontologist. It is a hairy form, like the four preceding, and will, no doubt, with those constitute a pretty homogeneous group.

### *ZYGONOPUS*,\* nov. gen.

*Char. gen.*—Sixth pair of legs very robust and with the third joint greatly swollen (a unique feature amongst *Myriapods*, and one which, like the claspers and intromittent organ of *Branchipods*, is to be regarded as a secondary sexual character, and of value in the characterization of a genus).

9. *ZYGONOPUS WHITEI*, n. sp.

*Char. specif.*—Head with short, dense hairs. No eyes, but there is a well-marked depression, or rather vertical excavation, extending from the end of the labrum to behind and above the insertion of the antennæ. Behind the antennæ the head is much swollen, owing to the outwardly bulging basal pieces of the jaws; labrum emarginate inferiorly; epieranium emarginate behind to receive the anterior semicircular margin of the first

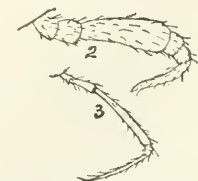


Fig. 1. Front view of head and antenna.

Fig. 2. Swollen 6th leg or clasper.

Fig. 3. Normal leg.

\* From ζυγός, a yoke, pair; γονέ, that which generates; and ποῦς, foot (leg).



scutum. Antennæ pilose, rather robust, 7-jointed, 5th longest; next longest in the 3d joint, then the 4th, 2d, 6th, 1st, and 7th, which last is provided with two or three blunt, tactile processes at the tip. Segments 32, including the head; an impressed dorsal line as in *Spirostrephon cæsioannulatus*. Delicate and numerous impressed lines on the hind margins of the dorsal scutes. Six bristles surmount each scute; two are placed obliquely on each side, and another is closer to the median line on each side; the upper ones on the four penultimate segments are at or near the posterior margin, and are shorter, blunter, and stouter; two of them project backwards from the margin of the preanal scute. Apparently no pores. Forty-seven pairs of legs in ♂, of which 45 are of the normal shape; 1st, 2d, 3d, 4th, and 5th gradually longer; a wide interval between the 5th and 6th pairs, the latter very robust, the 3d joint being much swollen and somewhat flattened inside, with the terminal and basal joints stouter than in the remaining legs; 7th pair weak, but normal; place of copulatory apparatus in the position of the 8th; 9th pair 2-jointed, with basal joint very short, while the 2d is four or five times as long and greatly swollen, looking in shape like a minute melon, and is extended horizontally outwards the same as the similar pair of organs in *Trichopetalum*. Forty-eight pairs of legs in ♀; appendages of 3d segment aborted as usual; sexual openings bounded laterally by rounded elevations. Normal posterior legs slender and pilose. The bristles on the back of the animal are received into basal sockets, and when removed give the appearance of a pore with an elevated rim. A yellowish substance adheres to the hairs in drops or beads in alcoholic specimens, which may be the offensive secretion of the animal which has exuded at the base of the bristles, though there is none of the characteristic odor apparent to the smell. Length of the animal 8.5<sup>mm</sup>. Color nearly white.

Of the above singular form I have received four specimens, three males and one female, which were sent me by Dr. C. A. White, who obtained them from the owner of Luray Cave, in Virginia, who had collected them in the cavern himself. Some time last summer he sent me specimens which, upon being subjected to a test with acetic acid, proved to be only a calcareous crust which had been deposited over dead specimens lying in the cave. These were collected by himself, and were interesting as showing how pseudomorphs of organic forms might be developed in caverns. The acid, however, dissolved them completely, and no vestige of the organic basis upon which they were molded remained. I at first supposed them to be some form of *Julus*, but could not be certain.

Out of nine related species known to inhabit this country but two are blind, the other being the *Spirostrephon* (*Scoterpes*) *copei* Packard, which inhabits Mammoth Cave, Kentucky. Another, which, according to Professor Cope, inhabits Wyandotte Cave, Crawford County, Indiana; Erhart's Cave, Montgomery County; and Spruce Run and Big Stony Creek

Caves, in Giles County, Virginia, curiously enough, is not blind. This is paralleled in the case of two species of spiders, however, which were collected for me in a cave in Oregon, over a year ago, by Professor Cope. In one of them there is not a vestige of the eyes remaining, while in the other they are well developed. A Myriapod, which appears to be a *Julus*, from the same cavern also has eyes. The *Polydesmus caricola* Packard, from a cave in Utah, seems to have well-developed eyes. The *Orchesella caeca*, which still remains to be fully described, has very undeveloped eyes, but differs in no other essential from its congeners. It was also collected in an Oregon cavern by Professor Cope. Multitudes of facts might be added, but the subject is too large a one for hasty generalizations, and must be approached with the same thoroughness of purpose which has characterized the work of Messrs. Darwin and Wallace in their essays upon kindred subjects relating to the origination of species. We may be allowed, however, to add that, in the absence of proof to the contrary, with the increase in the number of known blind forms which are often congeneric with light-loving species, there is the strongest kind of ground for supposing that they have descended from forms which had eyes, and which wandered into these recesses, where, after many generations had lived and died, a blind form appeared, which resulted from the gradual abortion of the visual organs of its ancestors. In proof of this we have the partially blind *Orchesella*, which now seems to be verging towards such a condition. In the absence of a greater number of facts we are not justified in inferring more. True, we have a few instances amongst the mollusks, some of which in their larval states have useful eyes, but which afterwards become useless and abort as the shell develops and gets thicker. Some terrestrial Myriapods are blind, such as *Eurypauropus*; so is *Lumbricus*, the earth-worm, and some of the dirt-abiding *Thysanura*, which also live among fallen leaves, such as *Campodea*, while in the burrowing *Symphyla* (*scolopendrelle*) the eyes are reduced to a single pair, with little or no red or dark coloring in the tapetum, differing widely in this respect from the compound-eyed, terrestrial Myriapods.

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DESCRIPTION OF A NEW SPECIES OF PRIONOTUS (PRIONOTUS STEPHANOPIHRYS), FROM THE COAST OF CALIFORNIA.

By W. N. LOCKINGTON.

*Prionotus stephanophrys*, sp. nov.

L. lat. 53; D. 10-12; A. 11; P. 12; V. 1-5; C. 3-1-8-1-3.

Body less elongate than in *P. carolinus*, head not quite three and a half; greatest depth five and a third times in total length. Greatest depth under third dorsal ray.

Snout concave in profile; forehead convex immediately in front of eye, from which to the origin of the dorsal fin the profile rises in almost a

straight line. Dorsal outline from origin of dorsal fin to caudal slightly sigmoid, the portion under base of second dorsal nearly straight, while the caudal peduncle widens at its extremity, is two and a half times as long as its least depth, and at its narrowest place one-third as deep as the greatest depth of the fish. Abdominal outline slightly curved.

Snout twice as long as longitudinal diameter of eye, which is contained about four and a half times in the side of the head; interorbital width slightly less than longitudinal diameter of eye.

Bones of head less conspicuously striated than usual in the genus. Preorbital, suborbital ring and stay, and operculum distinctly striated, the striae radiating; upper surface of head punctate, with short striae on the upper margins of the orbit and on the occiput. Top of head and interocular space almost flat, a serrated, crest-like ridge over each eye (hence the specific name). The interorbital space unusually broad, not at all concave, as broad as eye; a slight trace of a cross furrow behind the eye. Central ridge of operculum distinct, and continued backwards considerably beyond its membranous edge as a strong, sharp spine. A similar sharp spine on the angle of the preoperculum. A strong spine, smaller than those on the gill-covers, on the scapular bone, and a similar one on the suprascapular region. A backward-directed preocular spine.

Mouth rather large, somewhat oblique, the maxillary extending to opposite front of eye; jaws nearly equal; entire upper edge of mandible hidden by the preorbital when the mouth is closed; lower edge of preorbital set with small spines terminating the striae. Upper jaw two and one-sixth times in length of side of head.

A band of several rows of villiform teeth along both jaws; tip of the upper jaw emarginate and toothless; villiform teeth on palatines and vomer. Tongue thick and fleshy. Eye lateral, almost circular; interorbital area flat transversely.

Gill-openings continuous, the membrane not joined to the isthmus; branchiostegals seven. Gill-rakers long and slender, about three-fourths as long as the diameter of the orbit.

First dorsal arising a little anterior to the tip of the operculum; the third and longest spine nearly equal to half the length of the head, the ninth and tenth spines very short, nearly hidden in the skin. First and second dorsal spines serrated anteriorly. Second dorsal with a nearly straight upper margin, but slightly highest in front; rays all once bifurcate. Anal commencing and ending slightly posterior to the origin and termination of the second dorsal; rays all once bifurcate. Posterior margin of caudal slightly concave when expanded; all the long rays except the two outer ones branched, the four central ones three times bifurcate.

Pectoral pear-shaped when expanded; the membrane between the rays very wide; all the rays bifurcate except the uppermost and lowermost; the tip of the fin reaching to the eighth or ninth anal ray when

turned straight backwards. The three pectoral filaments very slender, the uppermost about half as long as the pectoral fin, which is contained two and two-thirds times in the total length.

Ventrals four and three-fourths times in total length, their tips nearly reaching the vent; all the rays once bifurcate, the last united by membrane at its base to the abdomen.

Bases of pectoral and ventral fins oblique, the pectoral filaments in advance of the ventrals, which are inserted vertically below the anterior margin of the pectorals.

Scales of moderate size, finely ciliate. Lower jaw, gill-membrane, and sides and upper surface of head scaleless. Scales of breast rather smaller than those of back. A row of scales along the basal part of the outer caudal rays, other fins scaleless. Lateral line simple.

General color of body slaty gray or leaden upon the upper two-thirds, the lowest third white. A black spot on the dorsal between the fourth and fifth spines, traces of it between the fifth and sixth. Three rows of black spots on the second dorsal, the spots set saddlewise across the rays. Three rows of black spots on caudal, the terminal row between the rays. Anal white. Pectoral black, with whitish cloudings. Upper part of head rather darker than the body, a silvery tint about the posterior portion of maxillary, lower part of gill-cover, and base of pectoral.

A single specimen of this species was procured in the market of San Francisco, October, 1880, and was taken off Point Reyes. It is now in the United States National Museum, numbered 27048.

A large proportion of the fish brought to the San Francisco markets is procured in the tolerably deep water of the region between the rocky islets known as the Farallones, the entrance of San Francisco Bay, and Point Reyes, a rocky promontory some forty miles north of San Francisco. This locality yielded the first specimens of *Artedius quadriseriatus* Locktn., *Odontopyxis trispinosus* Locktn., *Agonus vulsus* J. & G., *Brachyopsis verrucosus* Locktn., *Brachyistius rosaceus* J. & G., *Hippoglossoides exilis* J. & G., *Atheresthes stomias* J. & G., *Cynicoglossus pacificus* Locktn., and *Glyptocephalus zachirus* Locktn. *Brachyopsis xyosternus* J. & G. and *Artedius pugettensis* Steind. occur there in tolerable abundance, and it has now furnished the first example of a genus hitherto not known to occur north of the Gulf of Fonseca.

Günther (Cat. Fish. Brit. Mus. ii, 195, 196) gives a short diagnosis of three species of *Prionotus* from the Pacific, *P. horrens* Rich., *P. birostratus* Rich., both from the Gulf of Fonseca, and *P. miles* Jenyns, from the Galapagos. *P. stephanophrys* most resembles the latter species, but has much longer pectorals and a different coloration, the latter being "above mottled brilliant tile-red; beneath silvery white".



Table of proportionate measurements.

Locality.....	Point Reyes, Cal.	
	Inches and 100ths.	100ths of length.
Extreme length.....	7. 60	.....
Length to base of middle caudal rays.....	6. 35	100
Body:		
Greatest height.....		26
Least height of tail.....		7
Length of caudal peduncle.....		15
Preopercular spine.....		4
Head:		
Greatest length to tip of opercular spine.....		41
Distance from snout to nape.....		28
Greatest depth at occiput.....		22
Width of interorbital area.....		7
Length of snout.....		15½
Length of operculum to end of spine.....		14½
Length of maxillary.....		16
Length of mandible.....		20
Occipital process.....		7½
Diameter of orbit.....		8½
Dorsal:		
Distance from snout.....		36½
Length of base.....		25½
Height at third spine.....		17
(Soft) length of base.....		28
Height at longest ray.....		15
Height at last ray.....		7
Anal:		
Distance from snout.....		62
Length of base.....		26
Height at longest ray.....		11½
Caudal:		
Length of middle rays.....		21
Length of external rays.....		25
Pectoral:		
Upper appendage.....		25
Second appendage.....		21
Third appendage.....		17½
Length.....		47½
Ventral:		
Distance from snout.....		32
Length.....		25
Branchiostegals.....		VII
Dorsal.....		X-12
Anal.....		I-10
Pectoral.....		13-III
Number of scales in lateral line.....		54

SAN FRANCISCO, CAL., November 15, 1880.

THE FRIGATE MACKEREL, *AUXIS ROCHEI*, ON THE NEW ENGLAND COAST.

By G. BROWN GOODE.

The United States Fish Commission has obtained numerous specimens of a fish before entirely unknown in the Western Atlantic. This is the frigate mackerel, *Auxis Rochei*, twenty-eight barrels of which were taken in a mackerel seine ten miles east of Block Island, on the 3d of August, by the schooner "American Eagle", Capt. Josiah Chase, of Provincetown, Mass.

The frigate mackerel resembles, in some particulars, the common mackerel; in others, the bonito—the genus *Auxis* being intermediate in



its character between the *Scomber* and the related genera *Pelamys* and *Oreynus*. It has the two dorsal fins remote from each other, as in *Scomber*, and the general form of the body is slender, like that of the mackerel. The body is, however, somewhat stouter, and, instead of being covered with small scales of uniform size, has a corselet of larger scales under and behind the pectoral fins. Instead of the two small keels upon each side of the tail, which are so noticeable in the mackerel, it has the single, more prominent keel of the bonito and the tunny. Its color is grayish blue, something like that of the pollack, the belly being lighter than the back. Under the posterior part of the body, above the lateral line, are a few cloudings or maculations resembling those of the mackerel. The occurrence of a large school of this beautiful species in our waters is very noteworthy, for the fish now for the first time observed are very possibly the precursors of numerous schools yet to follow. It is not many years since the bonito became an inhabitant of our waters, and the distribution and habits of the frigate mackerel are supposed to be very similar to those of the bonito, *Sarda pelamys*, and the little tunny, *Oreynus thynnus*, which also first came on the coast in 1871, and have since been found in considerable numbers.

The frigate-mackerel has been observed in the West Indies and other parts of the tropical Atlantic, as well as on the coast of Europe. In Great Britain it is called the "plain bonito". It is not unusual in the Bermudas, where it is called the "frigate mackerel", a name not inappropriate for adoption in this country, since its general appearance is more like that of the mackerel than the bonito, while in swiftness and strength it is more like the larger members of this family.

Since the first appearance of this fish many new observations of its abundance have been received. These fish seem to have come in immense schools into the waters between Montauk Point and George's Bank; and from Mr. Clarke's statements it appears that they have been observed in small numbers by fishermen in previous years. Several vessels have come into Newport recently reporting their presence in immense numbers in the vicinity of Block Island. It will interest the "ichthyophagists" to know that several persons in Newport have tested the fish, and pronounce it inferior to the bonito. Part of the flesh, that on the posterior part of the body, is white, but behind the gills it is black and rank, while the meat near the backbone is said to be of disagreeable, sour flavor.

It is hard to predict what its influence will be upon other fishes already occupying our waters. Its mouth is small and its teeth feeble, so that it is hardly likely to become a ravager, like the bonito and the bluefish. There is little probability, on the other hand, that its advent will be of any special importance from an economical point of view, for its oil does not seem to be very abundant, and it would hardly pay at present to capture it solely for the purpose of using its flesh in the manufacture of fertilizers.

Mr. A. Howard Clarke, in charge of the Fish Commission station at Gloucester, has communicated to Professor Baird some interesting facts regarding its abundance. From these statements it would also appear that the species has been observed occasionally in past years. He writes under date of August 10: "I have received this morning from the schooner 'Fitz J. Babson', just arrived from Block Island, a fish answering to your description of the *Auxis*, having a corselet of scales around the pectoral fin, as in the tunny. The captain of the vessel, Joshua Riggs, reports that about a week ago he had a hundred barrels in the seine at one time, and saw over twenty schools of them. He saw them as far east as Sow-and-Pig Light Ship. They are very easy to catch, flip like menhaden, do not rush, and are not frightened at the seine. They go in immense numbers; he thinks as many as one thousand barrels to a school. The day after the appearance of these fish the mackerel disappeared, but he does not know whether the mackerel were driven away by them or not. They feed on mackerel food. Mr. Daniel Hiltz, of the same vessel, says that he caught one of just the same kind, in February, 1879, on a haddock-trawl on the eastern part of the Middle Bank, in forty fathoms of water. He took it to Boston, where it was called a young bonito.

"Mr. John Henderson, of the schooner 'Sarah C. Wharf', says that two vessels caught such fish recently eastward of here. The schooner 'American Eagle', of Provincetown, took a number of barrels of them into Newport, and sold them for a dollar a barrel. Another Cape Cod vessel—he does not know her name—"took about fifty barrels of them and threw them away. All the mackerel-seiners from Block Island report seeing quantities of this new fish within the past fortnight. The captain of the schooner 'Sarah C. Wharf' says he first saw them a fortnight ago, some fifteen miles off Block Island. The captain and several of the crew of the 'Ella M. Johnson', of Newburyport, just arrived from Block Island, state they saw abundance of the *Auxis*, but did not know what it was until reports came from you at Newport. They opened one and found in its stomach the ordinary red-mackerel food. This crew differ with the crew of the schooner 'Fitz J. Babson', with regard to the ease of capturing them; think them rather difficult to take; say they flip like porgies, and do not rush like mackerel. They saw ten large schools of them on Saturday last, when some fifteen miles south of Block Island."

I hope that any reader of the American Naturalist who has seen this fish will mention it. Some may, perhaps, have an opportunity of studying its habits. The length of those I have seen ranges from 12 to 16 inches, and their weight from three-quarters of a pound to a pound and a half or more. Those sent to New York market were part of the lot taken by the schooner "American Eagle" and brought into Newport, whence they were shipped by Mr. Thompson, a fish-dealer of that place. It would require from eighty to one hundred of them to fill a barrel; so

the estimate of Captain Riggs, that there are a thousand barrels in one of the schools, shows how exceedingly abundant they must be. The name "frigate mackerel", used in Bermuda, would seem to be the best name for use in this country, since the fish resemble the mackerel more than they do the bonito or tunny.

Capt. N. E. Atwood, of Provincetown, Mass., the veteran fisherman-ichthyologist, has examined the specimens, and is satisfied that they belong to the same species with a fish which he found abundant in the Azores in 1849, when, led by the reports of Cape Cod whalers, he went to these islands in search of mackerel, the mackerel-fishing being poor at home. No mackerel were found except the frigate mackerel referred to in this note.

**NOTACANTHUS PHASGANORUS, A NEW SPECIES OF NOTACANTHIDE FROM THE GRAND BANKS OF NEWFOUNDLAND.**

**By G. BROWN GOODE.**

The United States Fish Commission has received from the schooner "Gatherer," of Gloucester, Captain Briggs Gilpatrick, a remarkable fish taken from the stomach of a ground-shark, *Somniosus brevipinnis*, on the Grand Bank of Newfoundland.

**Notacanthus**, Bloch.

*Notacanthus*, BLOCH.

*Acanthonotus*, BLOCH, Ichthyologia, xii, 1797, p. 113, pl. cccxxxii. (No description separate from that of species *A. nasus*.)—SCHNEIDER, Bloch, Syst. Ichth. 1801, p. 390, pl. xlvii.

*Notacanthus*, LACÉPÈDE, Hist. Nat. Poiss. 1804.

Head and body much compressed, the body elongate, produced in a long pointed tail, shaped like that of *Macrurus* or *Fierasfer*. Snout produced, obtuse, rounded at its tip. The cleft of the mouth inferior. (The specimen is mutilated, but the maxillaries do not appear to be protractile. Dorsal fin almost rudimentary, consisting of very short, flexible spines, remote from each other and not connected by a membrane. Anal fin very long; its origin close behind the vent, which is situated nearly midway of the length of the body; its anterior portion is composed of separate flexible spines, without membrane, resembling those of the dorsal; these gradually lengthen, grading into the articulated branched rays. No caudal. Ventrals broad, with broad, peduncle-like bases, closely contiguous, separated only by a slight groove at the base, situated near the vent. Teeth acicular, in single rows upon maxillaries, in a double row upon mandibulars, villiform and in a double row upon the palatines. Vomerine teeth not apparent (?). Scales very numerous, of moderate size, round, thin, flexible. Branchiostegals about 8; gills 4.

**Notacanthus phasganorus**, new species.

The body is much compressed, its greatest width slightly more than one-third the height of the body at the vent, its width at the tail from

one-fourth to one-fifth of its height, and about one-thirteenth of the length of the head. Its length is about one-eighth its height at the vent.

The scales are round, thin, flexible, very small upon the head, not wider than the diameter of one of the dorsal spines, but upon the anterior half of the body they are about three times as large, decreasing in size upon the posterior half, until upon the tail they are smaller than upon the head. The number of scales in the lateral line is not far from 400, but in the partially digested specimen before me it is impossible to make an exact enumeration. The number between the lateral line and the dorsal fin is about 20, between the lateral line and the anal fin about 36. The head is covered in every part, even the lips, with small scales. There are about 40 between the eye and the end of the opercular flap. The scales are deeply imbedded, and in life are probably hidden beneath a slimy epidermis.

The length of the head is contained about seven and one-third times in that of the body. Its bones are all flexible, and their outlines are invisible without dissection, the whole being covered with a leathery skin protected by scales. The width of the interorbital space appears to be (in the mutilated head) somewhat greater than the length of snout, and about one-fourth the length of the head. The diameter of the orbit appears to be about one-half the width of the interorbital space. The length of the postorbital portion of the head is nearly three times that of the snout. The length of the mandibular bone slightly exceeds twice the diameter of the eye; that of the upper jaw is considerably greater. The teeth in the upper jaw are blunt, acicular, set side by side like the teeth of a comb, about 32 on each side. In the lower jaw they are shorter, slenderer, and in double rows. Villiform teeth upon the palatines.

The dorsal fin begins at a distance from the snout not far from two and three-fourth times the length of the head, and nearly over the one hundred and tenth scale of the lateral line. It consists of ten low, widely separated spines, unconnected by any membrane. The distance between the first and tenth spine is nearly double the length of the head.

The spines from the fourth to the ninth are about equidistant, while the other interspaces are shorter.

The distance from the snout to the anal fin is equal to about four times the length of the head. The anterior spinous portion of the anal resembles the dorsal and is devoid of connecting membrane. The membrane is also absent from the posterior half of the fin, but may possibly have been destroyed. The anal rays extend to the tip of the elongate tail and number about 130, the number of spines being 19. The anal begins immediately behind the vent, and its length of base is slightly less than half that of the body—less by a length about equal to the distance from the angle of the mouth to the gill-opening.

The pectoral fin is placed at a distance behind the gill-opening about equal to the width of its own base. Its length is at least double this



distance—how much more cannot be determined, but the fin is evidently short and rounded in contour, the upper rays longest. Its base is stout-peduncular, and thickly covered with scales.

The distance of the ventrals from the snout is equal to that of the dorsal, though its insertion is slightly in advance of that of the dorsal. The two ventrals are closely adjacent, separated by a narrow groove, broad, with peduncle-like bases, thickly covered with scales. They are provided with two spines and eight or nine (as nearly as the specimen will permit determination) rays.

D. X; A. XIX (130); C. 0; P. (17); V. II, 8-9.

*Measurements.*

	Millimeters.
Extreme length .....	963
Body:	
Height at vent .....	110
Greatest width .....	(40)
Head:	
Greatest length .....	132
Width of interorbital area .....	(34)
Length of snout .....	30
Length of postorbital portion (measured diagonally) .....	87
Length of upper jaw .....	40
Length of mandible .....	36
Diameter of orbit .....	17
Dorsal:	
Distance from snout .....	350
Length of base .....	215
Length of first spine .....	2
Length of last spine .....	7
Distance between first and second spines .....	7
Distance between second and third spines .....	19
Distance between third and fourth spines .....	22
Distance between fourth and fifth, fifth and sixth, sixth and seventh, seventh and eighth, and eighth and ninth spines .....	25
Distance between ninth and tenth spines .....	21
Anal:	
Distance from snout .....	437
Length of base .....	525
Height at first spine .....	2
Pectoral:	
Distance from snout .....	150
Length .....	(40)
Ventral:	
Distance from snout .....	350
Length .....	20+





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U. S. NATIONAL MUSEUM.

— 27 —

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### LIST OF CORRECTIONS.

[Vol. IV, Proc. Nat. Mus. 1881.]

Page v, line 11, for memoranda of, &c., read memoranda for, &c.

Page 327, line 45, for PILENICOPHAININÆ read PILENICOPHAININÆ.

Page 455, line 1, for LIST OF ANTHROPOLOGICAL PUBLICATIONS read LIST OF AN-  
THROPOLOGICAL PUBLICATIONS OF CHARLES RAU.

Page 472, line 29, for *Sebastichthys ruber* read *Sebastichthys proriger* Jor. & Gill.

Page 472, line 36, for *Sebastodes paucispinis* read *Sebastichthys proriger* Jor. &



# PROCEEDINGS

OF THE

## UNITED STATES NATIONAL MUSEUM.

1881.

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**CHECK-LIST OF DUPLICATES OF FISHES FROM THE PACIFIC  
COAST OF NORTH AMERICA, DISTRIBUTED BY THE SMITH-  
SONIAN INSTITUTION IN BEHALF OF THE UNITED STATES  
NATIONAL MUSEUM, 1881.**

Prepared by **DAVID S. JORDAN** and **PIERRE L. JOUY.**

### HIPPOCAMPIDÆ.

**1. *Hippocampus ingens* Grd.**

7404. California.

### SYNGNATHIDÆ.

**2. *Siphostoma leptorhynchus*\* (Grd.) J. & G.**

26808. San Diego, California.

**3. *Siphostoma californiense* (Storer) J. & G.**

26943. Santa Barbara, California.

27050. Monterey, California.

27199. San Francisco, California.

27380. Santa Barbara, California.

### AULORHYNCHIDÆ.

**4. *Aulorhynchus flavidus* Gill.**

27021. Monterey, California.

### GASTEROSTEIDÆ.

**5. *Gasterosteus* (aculeatus var.) *cataphractus*† (Pallas) J. & G.**

27284. Puget Sound.

**6. *Gasterosteus microcephalus* Grd.**

7814. San Francisco, California.

### PLEURONECTIDÆ.

**7. *Aphoristia atricauda* Jor. & Gilb.**

(Types.)

27396. San Diego, California.

**8. *Pleuronichthys verticalis* Jor. & Gilb.**

(Types.)

26979. Monterey, California.

| 27230. San Francisco, California.

\* Including *Syngnathus dimidiatus* Gill.

† *Gasterosteus serratus* Ayres.

9. *Pleuronichthys decurrens* Jor. & Gilb.

(Types.)

26978. Monterey, California.	27115. San Francisco, California.
------------------------------	-----------------------------------

10. *Pleuronichthys cænosus* Grd.

25025. Santa Catalina Island, California.	27123. San Francisco, California.
25049. Wilmington, California.	27231. " "
26769. San Diego, California.	27274. Puget Sound.
27056. Monterey, California.	27298. "

11. *Hypsopsetta guttulata* (Grd.) Gill.

24871. San Diego, California.	26841. San Pedro, California.
24910. " "	26902. Santa Barbara, California.
26768. " "	26938. " "

12. *Cynicoglossus pacificus* Lockington.

27058. Monterey, California.	27302. Puget Sound.
27228. San Francisco, California.	

13. *Glyptocephalus zachirus* Lockington.

26985. Monterey, California.	27210. Point Reyes, California.
27124. San Francisco, California.	

14. *Pleuronectes stellatus* Pallas.

22683. California.	27059. Monterey, California.
24163. San Francisco, California.	27227. San Francisco, California.
24164. " "	27273. Puget Sound.
26915. San Luis Obispo, California.	

15. *Lepidopsetta bilineata* (Ayres) Gill.

27003. Monterey, California.	27299. Puget Sound.
27117. San Francisco, California.	

16. *Parophrys ischyryus* Jor. & Gilb.

(Types.)

27266. Puget Sound.

17. *Parophrys isolepis* (Lock.) J. & G.

(Types.)

26932. Monterey, California.	27301. Puget Sound.
27116. San Francisco, California.	27347. "
27229. " "	

18. *Parophrys vetulus* Grd.

27057. Monterey, California.	27300. Puget Sound.
27232. San Francisco, California.	

19. *Citharichthys sordidus* (Grd.) Gthr.

24168. San Francisco, California.	27233. San Francisco, California.
27002. Monterey, California.	27325. Puget Sound.
27120. San Francisco, California.	

20. *Psettichthys melanostictus* Grd.

27000. Monterey, California.	27234. San Francisco, California.
27119. San Francisco, California.	27348. Puget Sound.

21. *Hippoglossoides exilis* Jor. & Gilb

(Types.)

27061. Monterey, California.	27121. San Francisco, California.
------------------------------	-----------------------------------



22. *Hippoglossoides classodon* Jor. & Gilb.

(Types.)

27062. Puget Sound.

| 27263. Puget Sound.

23. *Hippoglossoides jordani* Lockington.

26981. Monterey, California.

| 27118. San Francisco, California.

24. *Paralichthys maculosus* Grd.

17063. Santa Barbara, California.

24813. San Diego, California.

24874. " " "

25079. Santa Barbara, California.

26767. San Diego, California.

26847. San Pedro, California.

26930. Santa Barbara, California.

27067. Monterey, California.

27125. San Francisco, California.

25. *Xystreureys liolepis* Jor. & Gilb.

(Types.)

26884. Santa Barbara, California.

26. *Hippoglossus vulgaris* Flem.

27326. Straits of Fuca. (Skulls.)

27. *Atheresthes stomias* Jor. & Gilb.

(Types.)

27122. Point Reyes, California.

| 27186. Point Reyes, California.

GADIDÆ.

28. *Merlucius productus* (Ayres) Gill.

27010. Monterey, California.

27167. San Francisco, California.

| 27203. San Francisco, California.

| 27295. Puget Sound.

29. *Pollachius chalcogrammus* (Pallas) J. & G.

27312. Puget Sound.

30. *Gadus morrhua* L.

27318. Puget Sound.

31. *Microgadus proximus* (Grd.) Gill.

24656. San Francisco, California.

27183. " " "

| 27317. Puget Sound.

BROTULIDÆ.

32. *Brosmophycis marginatus* (Ayres) Gill.

27045. Point Reyes, California.

OPHIDIIDÆ.

33. *Ophidium taylori* Grd.

7863. California.

27130. San Francisco, California.

| 27393. Monterey, California.

CONGROGADIDÆ.

34. *Scytalina cerdale* Jor. & Gilb.

(Types.)

27400. Cape Flattery, Washington Territory.

## ZOARCIDÆ.

35. *Lycodopsis pacificus* Collett.

27143. Point Reyes, California.	27334. Cape Flattery, Washington Territory.
---------------------------------	---

36. *Lycodopsis paucidens*\* (Lock.) Gill.

27142. Point Reyes, California.	
---------------------------------	--

## BLENNIIDÆ.

37. *Anarrhichthys ocellatus* Ayres.

23396. Neah Bay, Washington Territory.	27194. San Francisco, California.
27054. Monterey, California.	27272. Puget Sound.
27149. San Francisco, California.	

38. *Lumpenus anguillaris* (Pallas) Gill.

27154. Puget Sound.	27258. Puget Sound.
---------------------	---------------------

39. *Xiphister rupestris* Jor. & Gilb.

(Types.)

27001. Monterey, California.	27327. Cape Flattery, Washington Territory.
------------------------------	---

40. *Xiphister muccus* (Grd.) Jor.

26999. Monterey, California.	27328. Cape Flattery, Washington Territory.
------------------------------	---

41. *Xiphister chirus* J. & G.

(Types.)

27175. Monterey, California.	27338. Puget Sound.
------------------------------	---------------------

42. *Cebedichthys violaceus* Grd.

26998. Monterey, California.	27392. San Francisco, California.
------------------------------	-----------------------------------

43. *Anoplarchus alectrolophus* (Pallas) J. & G.

27339. Cape Flattery, Washington Territory.	
---	--

44. *Apodichthys fucorum* Jor. & Gilb.

(Types.)

26994. Monterey, California.	
------------------------------	--

45. *Apodichthys flavidus* Grd.

6674. California.	27163. San Francisco, California.
7334. San Francisco, California.	27193. " "
20328. California.	27335. Cape Flattery, Washington Territory.
23408. Neah Bay, Washington Territory.	

46. *Muraenoides ornatus*† (Grd.) Gill.

27181. Puget Sound.	27330. Cape Flattery, Washington Territory.
27192. " "	

47. *Cremnobates integripinnis*‡ Rosa Smith.

26547. San Diego, California.	27404. San Diego, California (types)
-------------------------------	--------------------------------------

48. *Gibbousia elegans* Cooper.

27037. Monterey, California.	27394. Monterey, California.
27383. San Diego, California.	27416. San Diego, California.

\* Perhaps a form of the preceding.

† Most of the specimens distributed belong to the form called *Muraenoides letus* (Cope).‡ Probably identical with *Cremnobates monophthalmus* Gthr.

**49. *Heterostichus rostratus* Grd.**

20570. California.	26763. San Diego, California.
24996. Wilmington, California.	26890. Santa Barbara, California.
25019. Santa Catalina Island, California.	27301. Monterey, California.
25048. Wilmington, California.	

**50. *Neoclinus blanchardi* Grd.**

26883. Santa Barbara, California.	27179. Monterey, California.
26942. " "	

**51. *Neoclinus satiricus* Grd.**

22334. Monterey, California.	27040. Monterey, California.
------------------------------	------------------------------

**52. *Hypleurochilus gentilis* (Grd.) Gill.**

26917. Santa Barbara, California.
-----------------------------------

**BATRACHIDÆ.**

**53. *Porichthys porosissimus* (Cuv. & Val.) Gthr.**

26889. Santa Barbara, California.	27132. San Francisco, California.
27009. Monterey, California.	27200. " "
27063. " "	27277. Puget Sound.

**GOBIESOCIDÆ.**

**54. *Gobiesox reticulatus* Grd.**

27012. Monterey, California.	27329. Cape Flattery, Washington Territory.
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**LIPARIDIDÆ.**

**55. *Liparis pulchellus* Ayres.**

27081. Monterey, California.
------------------------------

**AGONIDÆ.**

**56. *Brachyopsis verrucosus* Lockington.**

(Types.)

27184. Point Reyes, California.
---------------------------------

**57. *Brachyopsis xyosternus* J. & G.**

(Types.)

27188. Point Reyes, California.	27395. Soquel, California.
---------------------------------	----------------------------

**58. *Podothecus acipenserinus* (Pallas) Gill.**

27332. Cape Flattery, Washington Territory.
---

**COTTIDÆ.**

**59. *Ascelichthys rhodorus* J. & G.**

(Types.)

27331. Cape Flattery, Washington Territory.
---

**60. *Cottopsis gulosus* Grd.**

7817. San Francisco, California.	27390. McCloud River, California.
----------------------------------	-----------------------------------

**61. *Cottopsis semiscaber* Cope.**

27414. Utah Lake, Utah.
-------------------------

**62. *Cottopsis asper* (Rich.) Grd.**

3306. Puget Sound.	27145. Sacramento River, California.
6052. " "	27268. Puget Sound.
12963. Mare Island, California.	27281. Columbia River.
12966. " "	

**63. *Cottus polyacanthocephalus* Pallas.**

27262. Puget Sound.

**64. *Artedius lateralis* Grd.**

23407. Neah Bay, Washington Territory.

| 27337. Cape Flattery, Washington Territory.

**65. *Artedius notospilotus* Grd.**

25037. Santa Barbara, California.

| 26865. Santa Barbara, California.

25082. " "

| 27146. Puget Sound.

**66. *Artedius quadriseriatus* Lockington.**

26848. San Francisco, California.

| 27133. San Francisco, California.

**67. *Artedius pugetensis* Steind.**

27185. Point Reyes, California.

| 27238. Straits of Fuca.

**68. *Hemilepidotus spinosus* Ayres.**

27011. Monterey, California.

| 27236. San Francisco, California.

27052. " "

| 27381. Monterey, California.

**69. *Hemilepidotus trachurus*\* (Pallas) Gthr.**

24672. Neah Bay, Washington Territory.

**70. *Aspicottus bison* Grd.**

27261. Puget Sound.

**71. *Scorpenichthys marmoratus* Grd.**

24142. San Francisco, California.

| 27053. Monterey, California.

25038. Santa Barbara, California.

| 27110. San Francisco, California.

25071. " "

| 27350. Puget Sound.

26888. " "

**72. *Leptocottus armatus* Grd.**

24822. San Diego, California.

| 27055. Monterey, California.

24862. " "

| 27147. San Francisco, California.

24906. " "

| 27267. Puget Sound.

**73. *Liocottus hirundo* Grd.**

26887. Santa Barbara, California.

**74. *Blennicottus globiceps* (Grd.) Gill.**

27336. Cape Flattery, Washington Territory.

**75. *Oligocottus maculosus* Grd.**

27177. Monterey, California.

| 27333. Cape Flattery, Washington Territory.

**76. *Oligocottus analis* Grd.**

26761. San Diego, California.

| 27415. San Diego, California.

27051. Monterey, California.

**77. *Blepsias cirrhosus* (Pallas) Gthr.**

27240. Straits of Fuca.

**78. *Nautichthys oculofasciatus* Grd.**

27239. Straits of Fuca.

**SCORPÆNIDÆ.****79. *Scorpæna guttata* Grd.**

24982. Wilmington, California.

| 26861. San Pedro, California.

24998. " "

| 26879. Santa Barbara, California. °

25026. Santa Catalina Island, California.

\* *Hemilepidotus gibbsi* Gill; *Tennistia ventricosa* Rich.

**80. *Sebastichthys nigrocinctus* (Ayres) Gill.**

26991. Monterey, California.

| 27285. Puget Sound.

**81. *Sebastichthys serripes* Jor. & Gilb.**

(Types.)

25005. San Pedro, California.

| 27041. Monterey, California.

26918. Santa Barbara, California.

| 27090. San Francisco, California.

**82. *Sebastichthys nebulosus* (Ayres) Gill.**

23397. Neah Bay, Washington Territory.

| 27093. San Francisco, California.

24674. " "

| 27343. Puget Sound.

26986. Monterey, California.

**83. *Sebastichthys chrysomelas* Jor. & Gilb.**

(Types.)

25076. Santa Barbara, California.

| 26934. Santa Barbara, California.

26880. " "

| 26963. Monterey, California.

**84. *Sebastichthys carnatus* Jor. & Gilb.**

(Types.)

24144. San Francisco, California.

| 27098. San Francisco, California.

26993. Monterey, California.

**85. *Sebastichthys maliger* Jor. & Gilb.**

(Types.)

2002. Puget Sound.

| 27208. San Francisco, California.

26970. Monterey, California.

| 27309. Puget Sound.

27091. San Francisco, California.

**86. *Sebastichthys caurinus* (Rich.) J. & G.**

27100. Puget Sound.

| 27294. Puget Sound.

**87. *Sebastichthys vexillaris* Jor. & Gilb.**

(Types.)

26967. Monterey, California.

| 27087. San Francisco, California.

**88. *Sebastichthys rastrelliger* Jor. & Gilb.**

(Types.)

25023. Santa Catalina Island, California.

| 27033. Monterey, California.

25053. San Pedro, California.

| 27102. San Francisco, California.

26908. Santa Barbara, California.

**89. *Sebastichthys auriculatus* (Grd.) Gill.**

15039. Mouth of Russian River, California.

| 26935. Santa Barbara, California.

15040. " "

| 27104. San Francisco, California.

26904. Santa Barbara, California.

| 27293 (var). Puget Sound.

**90. *Sebastichthys rubrivinctus* Jor. & Gilb.**

(Types.)

26989. Monterey, California.

**91. *Sebastichthys chlorostictus* Jor. & Gilb.**

(Types.)

26964. Monterey, California.

| 27092. San Francisco, California.

**92. *Sebastichthys rhodochloris* Jor. & Gilb.**

(Types.)

26967. Monterey, California.

| 27106. San Francisco, California.



**93. *Sebastichthys rosaceus* (Grd.) Lock.**

24148. San Francisco, California.	27089. San Francisco, California.
24657. " "	27211. " "
26961. Monterey, California.	

**94. *Sebastichthys constellatus* Jor. & Gilb.**

(Types.)

24147. San Francisco, California.	27086. San Francisco, California.
26963. Monterey, California.	

**95. *Sebastichthys ruber* (Ayres) Lock.**

26962. Monterey, California.	27346. Puget Sound.
27097. San Francisco, California.	

**96. *Sebastichthys miniatus* Jor. & Gilb.**

(Types.)

26965. Monterey, California.	27213. San Francisco, California.
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**97. *Sebastichthys pinniger* (Gill) Lock.**

23398. Neah Bay, Washington Territory.	27099. San Francisco, California.
26966. Monterey, California.	27344. Puget Sound.

**98. *Sebastichthys atrovirens* Jor. & Gilb.**

(Types,)

24994. San Pedro, California.	26870. Santa Barbara, California.
25010. " "	26903. " "
25052. " "	27032. Monterey, California.
25054. " "	27096. San Francisco, California.

**99. *Sebastichthys elongatus* (Ayres) Gill.**

26960. Monterey, California.	27095. San Francisco, California.
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**100. *Sebastichthys proriger* Jor. & Gilb.**

(Types.)

24658. San Francisco, California.	27105. San Francisco, California.
26980. Monterey, California.	

**101. *Sebastichthys ovalis* (Ayres) Lock.**

27043. Monterey, California.
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**102. *Sebastichthys entomelas* Jor. & Gilb.**

(Types.)

27044. Monterey, California.
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**103. *Sebastichthys mystinus* Jor. & Gilb.**

(Types.)

26971. Monterey, California.	27085. San Francisco, California.
27031. " "	

**104. *Sebastichthys ciliatus*\* (Tilesius) J. & G.**

27255. Kodiak, Alaska.
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**105. *Sebastichthys melanops* (Grd.) Gill.**

24669. Neah Bay, Washington Territory.	27088. San Francisco, California.
27042. Monterey, California.	27319. Puget Sound.

**106. *Sebastichthys flavidus* (Ayres) Lock.**

26984. Monterey, California.	27101. San Francisco, California.
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**107. *Sebastes paucispinis* (Ayres) Gill.**

26950. Santa Barbara, California.	27094. San Francisco, California.
26992. Monterey, California.	

CHIRIDÆ.

108. *Hexagrammus asper* Steller.

27280. Puget Sound.

109. *Hexagrammus superciliosus* (Pallas) J. & G.

27114. San Francisco, California.

110. *Hexagrammus decagrammus* (Pallas) J. & G.

23400, ♀.* Neah Bay, Washington Territory.	27214, ♀. San Francisco, California.
27005, ♀. Monterey, California.	27215, ♂. " "
27006, ♂.† " "	27278, ♂. Puget Sound.
27109, ♀. San Francisco, California.	27279, ♀. " "
27166, ♂. " "	27388, ♀. San Francisco, California.

111. *Ophiodon elongatus* Grd.

6645. California.	26893. Santa Barbara, California.
6653. " "	27047. Monterey, California.
24169. San Francisco, California.	27241. San Francisco, California.
24670. Neah Bay, Washington Territory.	

112. *Zaniolepis latipinnis* Grd.

27027. Point Reyes, near San Francisco, California

113. *Oxylebius pictus* Gill.

27174. Monterey, California.

114. *Anoplopoma fimbria* (Pallas) Gill.

24655. San Francisco, California.	27282. Puget Sound.
27128. " "	

GOBIIDÆ.

115. *Lepidogobius gracilis* (Grd.) Gill.

27135. San Francisco, California.

116. *Gillichthys mirabilis* Cooper.

26794. San Diego, California.

LATILIDÆ.

117. *Caulolatilus anomalus*† (Cooper) Gill.

24992. Wilmington, California.	26845. San Pedro, California.
25002. " "	26863. Santa Barbara, California.
25040. " "	27069. Monterey, California.

ICOSTEIDÆ?

118. *Bathymaster signatus* Cope.

27265. Puget Sound.

POMACENTRIDÆ.

119. *Chromis punctipinnis* Cooper.

24981. Santa Catalina Island, California.	25016. Santa Catalina Island, California.
24986. Wilmington, California.	26871. Santa Barbara, California.
25007. " "	

120. *Hypsypops rubicundus* (Grd.) Gill.

17764. San Francisco, California.	25047. Wilmington, California.
24995. Wilmington, California.	26945. Santa Barbara, California.

\* "*Chirus guttatus*" Grd.

† "*Chirus constellatus*" Grd.

‡ Probably identical with *Latilus princeps* Jenyns.

## LABRIDÆ.

121. *Pseudojulis modestus* (Grd.) Gthr.

25030. Santa Catalina Island, California.	26937. Santa Barbara, California.
25041. Santa Barbara, California.	26977. Monterey, California.
26882. " "	27376. Santa Barbara, California.

122. *PlatyGLOSSUS semicinctus* (Ayres) Gthr.

25001. Wilmington, California.

123. *Pimelometopon pulcher* (Ayres) Gill.

25000. Wilmington, California.	26869. Santa Barbara, California.
25078. Santa Barbara, California.	

## EMBIOTOCIDÆ.

124. *HysteroCARPUS traski* Gibbons.

27013. Sacramento River, California.

125. *Abeona minima* (Gibbons) Gill.

25085. Santa Barbara, California.	27029. Monterey, California.
26774. San Diego, California.	27078. " "
26913. Santa Barbara, California.	

126. *Abeona aurora* Jor. & Gilb.

(Types.)

26996. Monterey, California.	27155. San Francisco, California.
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127. *Cymatogaster aggregatus*\* Gibbons.

26914. Santa Barbara, California.	27243. San Francisco, California.
27080. Monterey, California.	27296. Puget Sound.
27165. San Francisco, California.	

128. *Brachyistius frenatus* Gill.

26891. Santa Barbara, California.	26990. Monterey, California.
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129. *Brachyistius rosaceus* Jor. & Gilb.

(Types.)

27170. Point Reyes, California.

130. *Holconotus analis* (A. Agassiz) J. & G.

27075. Monterey, California.

131. *Holconotus argenteus* (Gibbons) J. & G.

24836. San Diego, California.	26895. Santa Barbara, California.
24914. " "	26912. " "
25065. Santa Barbara, California.	27073. Monterey, California.
25069. " "	27158. San Francisco, California.

132. *Holconotus agassizii* (Gill) J. & G.

27076. Monterey, California.	27157. San Francisco, California.
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133. *Holconotus rhodoterus*† Ag.

26901. Santa Barbara, California.	27074. Monterey, California.
26933. " "	27156. San Francisco, California.

134. *Amphistichus argenteus* Ag.

24149. San Francisco, California.	26885. Santa Barbara, California.
25064. Santa Barbara, California.	27083. Monterey, California.
25077. " "	

\*Nos. 566, 567, 572, 17028, 17029, 17030, 17031, 17032, 17033, and 20340, sent out in previous distributions under the name of "*Holconotus rhodoterus* Ag.," belong to *Cymatogaster aggregatus*.  
†See note under *Cymatogaster aggregatus*.

**135. *Hypsurus caryi* (L. Agass.) A. Agass.**

26896. Santa Barbara, California.	27079. Monterey, California.
26940. " "	27129. San Francisco, California.
27017. Monterey, California.	

**136. *Ditrema jacksoni* (Agass.) Gthr.**

24157. San Francisco, California.	25017. Santa Catalina Island, California.
24835. San Diego, California.	25021. " "
24837. " "	25034. Santa Barbara, California.
24983. Wilmington, California.	27014. Monterey, California.
25011. " "	27242. San Francisco, California.

**137. *Ditrema laterale* (Agass.) Gthr.**

24151. San Francisco, California.	27028. Monterey, California
24152. " "	27310. Puget Sound.
27153. " "	27386. " "
26875. Santa Barbara, California.	

**138. *Ditrema atripes* Jor. & Gilb.**

(Types.)

26987. Monterey, California.
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**139. *Ditrema furcatum* (Grd.) Gthr.**

24831. San Diego, California.	26877. Santa Barbara, California.
26777. " "	26988. Monterey, California.

**140. *Damalichthys argyrosomus* (Grd.) J. & G.**

6194. Puget Sound.	26954. Santa Barbara, California.
25067. Santa Barbara, California.	27018. Monterey, California.
26894. " "	27313. Puget Sound.

**141. *Rhacochilus toxotes* Ag.**

24154. San Francisco, California.	26949 (fetal). Santa Barbara, California.
25012. Wilmington, California.	27015. Monterey, California.
26948. Santa Barbara, California.	

SCIÆNIDÆ.

**142. *Genyonemus lineatus* (Ayres) Gill.**

26911. Santa Barbara, California.	27152. San Francisco, California.
26972. Monterey, California.	

**143. *Corvina saturna* (Grd.) Gthr.**

24818. San Diego, California.	26759. San Diego, California.
25075. Santa Barbara, California.	26868. Santa Barbara, California.

**144. *Roncador searnsii* (Steind.) J. & G.**

25044. Wilmington, California.	26864. Santa Barbara, California
26757. San Diego, California.	

**145. *Umbrina xanti* Gill.**

26758. San Diego, California.	26872. Santa Barbara, California.
26849. San Pedro, California.	

**146. *Menticirrhus undulatus* (Grd.) Gill.**

25073. Santa Barbara, California.	26854. San Pedro, California.
26797. San Diego, California.	26878. Santa Barbara, California.

**147. *Cynoscion nobile* (Ayres) J. & G.**

26855. San Pedro, California.	27070. Monterey, California.
26876. Santa Barbara, California.	

**148. *Cynoscion parvipinnis* Ayres.**

24817. San Diego, California.	26753. San Diego, California.
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**149. *Seriphus politus* Ayres.**

6657. California.	27153. San Francisco, California
26804. San Diego, California.	27195. " "
26955. Santa Barbara, California.	

## PIMELEPTERIDÆ.

**150. *Girella nigricans* (Ayres) Gill.**

24987. Wilmington, California.	26867. Santa Barbara, California.
25008. " "	26956. " "
25072. Santa Barbara, California.	27384. San Diego, California.

**151. *Scorpius californiensis* Steind.**

24979. Santa Catalina Island, California.	25009. Wilmington, California.
24984. Wilmington, California.	26850. San Pedro, California.

## PRISTIPOMATIDÆ

**152. *Pristipoma davidsoni* Steind.**

26853. San Pedro, California.
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## SERRANIDÆ.

**153. *Serranus clathratus* (Grd.) Steind.**

20571. California.	26799. San Diego, California.
24985. San Pedro, California.	26851. San Pedro, California.
25013. " "	26886. Santa Barbara, California.
25042. " "	27046. Monterey, California.
25074. Santa Barbara, California.	

**154. *Serranus nebulifer* (Grd.) Steind.**

26754. San Diego, California.
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**155. *Serranus maculofasciatus* Steind.**

24819. San Diego, California.	26755. San Diego, California.
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## CENTRARCHIDÆ.

**156. *Archoplites interruptus* (Grd.) Gill.**

27020. Sacramento River, California.	27137. Sacramento River, California.
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## STROMATEIDÆ.

**157. *Stromateus simillimus* (Ayres) Gill.**

26800. San Diego, California.	27077. Monterey, California.
26910. Santa Barbara, California.	27162. San Francisco, California.
26959. " "	

## CARANGIDÆ.

**158. *Trachurus plumieri* (Lac.) J. & G.**

26838. San Pedro California.	27377. Santa Barbara, California.
26909. Santa Barbara, California.	

**159. *Seriola lalandi* Cuv. & Val.**

26835. San Pedro, California.
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## SCOMBRIDÆ.

**160. *Orcynus alalonga* (Gmelin) Risso.**

26873. Santa Barbara, California.
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**161. *Sarda chilensis* (C. & V.) J. & G.**

25031. San Diego, California.	26874. Santa Barbara, California.
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**162. *Scomberomorus concolor* (Lock.) J. & G.**

27205. Soquel, California.

AMMODYTIDÆ.

**163. *Ammodytes personatus* Grd.**

27025. Monterey, California.

| 27084. Monterey, California.

SPHYRÆNIDÆ.

**164. *Sphyræna argentea* Grd.**

25003. San Pedro, California.

| 26939. Santa Barbara, California.

26900. Santa Barbara, California.

| 27379. " "

ATHERINIDÆ.

**165. *Atherinopsis californiensis* Grd.**

24132. San Francisco, California.

| 26764. San Diego, California.

24869. San Diego, California.

| 26923. Santa Barbara, California.

**166. *Atherinops affinis* (Ayres) Steind.**

25006. Wilmington, California.

| 25083. Santa Barbara, California.

25035. Santa Barbara, California.

| 27202. San Francisco, California.

**166. *Leuresthes tenuis* (Ayres) J. & G.**

26766. San Diego, California.

MUGILIDÆ.

**168. *Mugil mexicanus* Steind.**

24827. San Diego, California.

| 26924. Santa Barbara, California.

24888. " "

| 27148. San Francisco, California.

26796. " "

SCOMBRESOCIDÆ.

**169. *Tylosurus exilis* (Grd.) J. & G.**

26756. San Diego, California.

**170. *Scombreox brevirostris* Peters.**

8885. Monterey Bay, California.

**171. *Hemirhamphus rosæ* Jor. & Gilb.**

(Types.)

24917. San Diego, California.

| 26790. San Diego, California.

**172. *Exocætus californicus* Cooper.**

26832. San Pedro, California.

| 26907. Santa Barbara, California.

CYPRINODONTIDÆ.

**173. *Cyprinodon californiensis* Grd.**

27373. San Diego, California.

**174. *Fundulus parvipinnis* Grd.**

26941. Santa Barbara, California.

SCOPELIDÆ.

**175. *Synodus lucioceph* (Ayres) Gill.**

26881. Santa Barbara, California.

| 27182. San Francisco, California.

27072. Monterey, California.

## SALMONIDÆ.

176. *Osmerus thaleichthys* Ayres.

27019. Monterey, California.

| 27136. San Francisco, California.

177. *Osmerus attenuatus* Lockington.

27204. San Francisco, California.

178. *Hypomesus olidus* (Pallas) Gill.

27150. San Francisco, California.

| 27276. Puget Sound.

179. *Thaleichthys pacificus* (Rich.) Grd.

20567. Columbia River, Oregon.

| 27297. Frazer's River, British Columbia.

180. *Salvelinus malma* (Walb.) J. & G.

27264. Puget Sound.

181. *Salmo purpuratus* Pallas (*Salmo clarki* Rich.).

27259. Puget Sound.

| 27360. Utah Lake, Utah.

182. *Salmo purpuratus*, subsp. *henshawi* Gill & Jordan.

24139. Lake Tahoe.

183. *Salmo irideus* Ayres.

26795. San Luis River, California.

27207. Sacramento River, California.

| 27356. Monterey, California.

184. *Salmo gairdneri* Rich.

27218. Columbia River.

185. *Oncorhynchus keta* (Walbaum) Gill & Jor.

24673. Neah Bay, Washington Territory.

27220. San Francisco, California.

| 27288. Frazer's River, British Columbia.

186. *Oncorhynchus kisutch* (Walb.) Jor. & Gilb.

27066. Puget Sound.

27250. Sacramento River, California.

27260. Puget Sound.

| 27289. Frazer's River, British Columbia.

27315. Puget Sound.

187. *Oncorhynchus chouicha* (Walb.) Jor. & Gilb. (*Salmo quinnat* Rich.).

27039. Monterey, California.

27067. " "

27217. " "

27237. Sacramento River.

| 27275. Puget Sound.

27287. Frazer's River, British Columbia.

27304. Columbia River.

27316. Puget Sound.

188. *Oncorhynchus nerka* (Walb.) Gill & Jor.

27303. Columbia River.

## ENGRAULIDIDÆ.

189. *Stolephorus ringens* (Jenyns) J. & G.

24824. San Diego, California.

24919. " "

26784. " "

| 26958. Santa Barbara, California.

27187. San Francisco, California.

190. *Stolephorus delicatissimus* (Grd.) J. & G.

24870. San Diego, California.

| 26786. San Diego, California.

191. *Stolephorus compressus* (Grd.) J. & G.

26785. San Diego, California.

| 26862. San Pedro, California.

## CLUPEIDÆ.

**192. *Clupea sagax* Jenyns.**

24820. San Diego, California.

24857. " "

24886. " "

26957. Santa Barbara, California.

27140. San Francisco, California.

27378. Santa Barbara, California.

**193. *Clupea mirabilis* Grd.**

24865. San Diego, California.

| 27351. Puget Sound.

## ALBULIDÆ.

**194. *Albula vulpes* (L.) Goode.**

26789. San Diego, California.

## CYPRINIDÆ.

**195. *Orthodon microlepidotus* (Ayres) Grd.**

2042. Puget Sound.

| 27139. Sacramento River.

**196. *Alburnus balteatus* (Rich.) Jor.**

2082. Puget Sound.

| 27341. Frazer's River, British Columbia.

**197. *Squalius gibbosus* (Ayres) J. & G. (*Siboma crassicauda* Grd.).**

27411. Sacramento River, California.

**198. *Squalius atrarius* (Grd.) Jor.**

27407. Utah Lake, Utah.

**199. *Squalius rhomaleus* Jor. & Gilb.**

(Types.)

27364. Utah Lake, Utah.

**200. *Squalius cruoreus* Jor. & Gilb.**

(Types.)

27408. Utah Lake, Utah.

**201. *Squalius copei* Jor. & Gilb.**

(Types.)

27409. Bear River, Evanston, Wyoming.

**202. *Squalius aliciae* Jouy.**

(Types.)

27412. Utah Lake, Utah.

**203. *Squalius tænia* (Cope) Jor.**

27410. Utah Lake, Utah.

**204. *Squalius montanus* (Cope) Jor.**

27411. Utah Lake, Utah.

**205. *Ptychochilus oregonensis* (Rich.) Ag.**

24128. Sacramento River, California.

27244. " "

27291. Columbia River, Oregon.

27352. Columbia River, Oregon.

27389. Puget Sound.

**206. *Ptychochilus harfordi* Jor. & Gilb.**

(Types.)

27246. Sacramento River, California.

**207. *Apocope vulnerata* Cope.**

27413. Utah Lake, Utah.

**208. *Pogonichthys macrolepidotus* (Ayres) J. & G.**

27134. Sacramento River, California.

**209. *Mylochilus caurinus* (Rich.) Ag.**

27271. Puget Sound.

27283. Columbia River.

27342. Frazer's River, British Columbia.

**210. *Mylopharodon conocephalus* Ayres.**

27245. Sacramento River, California.

CATOSTOMIDÆ.

**211. *Chasmistes liorus* Jor. & Gilb.**

27361. Utah Lake, Utah.

**212. *Catostomus fecundus* Cope & Yarrow.**

27362. Utah Lake, Utah.

**213. *Catostomus ardens* Jor. & Gilb.**

(Types.)

27363. Utah Lake, Utah.

**214. *Catostomus occidentalis* Ayres.**

27131. Sacramento River, California.

**215. *Catostomus macrochilus* Grd.**

27290. Columbia River.

SILURIDÆ.

**216. *Amiurus catus* (L.) Gill.**

27144. Sacramento River, California (introduced).

MURÆNIDÆ.

**217. *Muræna mordax* Ayres.**

24931. Wilmington, California.

25004. " "

25022. Santa Catalina Island, California.

26301. San Diego, California.

ACIPENSERIDÆ.

**218. *Acipenser transmontanus* Rich.**

27065. Sacramento River, California.

27269. Frazer's River, British Columbia.

**219. *Acipenser medirostris* Ayres.**

27223. San Francisco, California.

CHIMÆRIDÆ.

**220. *Chimæra colliæi* Bennett.**

26976. Monterey, California.

27226. San Francisco, California.

27311. Puget Sound

MYLIOBATIDÆ.

**221. *Myliobatis californicus* Gill.**

24815. San Diego, California.

26781. " "

26840. San Pedro, California.

26892. Santa Barbara, California.

27256. San Francisco, California.

## TRYGONIDÆ.

**222. *Pteroplatea marmorata* Cooper.**

26770. San Diego, California.

| 26929. Santa Barbara, California.

**223. *Dasybatus dipterurus* Jor & Gilb.**

(Types.)

26782. San Diego, California.

**224. *Urolophus halleri* Cooper.**

24834. San Diego, California.

25024. San Pedro, California.

26788. San Diego, California.

| 26834. San Pedro, California.

| 26925. Santa Barbara, California.

## RAIIDÆ.

**225. *Raia binoculara* Girard (*Raia cooperi* Girard).**

21583. Washington Territory.

27159. San Francisco, California.

| 27257. Puget Sound.

**226. *Raia rhina* Jor. & Gilb.**

(Types.)

27007. Monterey, California.

| 27292. Puget Sound.

**227. *Raia inornata* Jor. & Gilb.**

(Types.)

24161. San Francisco, California.

26974. Monterey, California.

| 27216. San Francisco, California.

| 27252 (egg). " "

**228. *Raia inornata* subsp. *inermis* Jor. & Gilb.**

(Types.)

26926. Santa Barbara, California.

**229. *Raia stellulata* Jor. & Gilb.**

(Types.)

26975. Monterey, California.

## RHINOBATIDÆ.

**230. *Zapteryx exasperatus* Jor. & Gilb.**

(Types.)

25050. San Diego, California.

**231. *Rhinobatus triseriatus* Jor. & Gilb.**

(Types.)

26773. San Diego, California.

26836. San Pedro, California.

| 26893. Santa Barbara, California.

**232. *Rhinobatus productus* Ayres.**

24826. San Diego, California.

26772. " "

| 26852. San Pedro, California.

| 26905. Santa Barbara, California.

## TORPEDINIDÆ.

**233. *Torpedo californica* Ayres.**

27212. Soquel, California (Monterey Bay).

## SQUATINIDÆ.

**234. *Squatina angelus* Duméril.**

26920. Santa Barbara, California.



## SPINACIDÆ.

235. *Squalus acanthias* L.

2638. California.  
6675. "

| 27305. Puget Sound.

## CESTRACIONTIDÆ.

236. *Heterodontus francisci* (Grd.) Gill.

24816. San Diego, California.  
24997. Wilmington, California.  
25020. Santa Catalina Island, California.  
26760. San Diego, California.

| 26803 (eggs). San Diego, California.  
26846. San Pedro, California.  
26928. Santa Barbara, California.

## NOTIDANIDÆ.

237. *Notorhynchus maculatus* Ayres.

27191. Humboldt Bay.

238. *Hexanchus corinus* Jor. & Gilb.

(Types.)

27196. Sequel, California.

## SCYLLIIDÆ.

239. *Catulus ventriosus* (Garman) J. & G.

25027. Santa Catalina Island, California.  
25055. Santa Barbara, California.  
25062. " "  
25084. " "

| 26866. Santa Barbara, California.  
26951 (egg). " "  
27251. Sequel, California.

## GALEORHINIDÆ.

240. *Mustelus hinnulus* (Blainv.) J. & G.

24823. San Diego, California.  
26771. " "

| 26856. San Pedro, California.  
26906. Santa Barbara, California.

241. *Rhinotriacis henlei* Gill.

27026. Monterey, California.

| 27189. San Francisco, California.

242. *Triacis semifasciatus* Grd.

25039. Santa Barbara, California.  
25081. " "

| 26921. Santa Barbara, California

243. *Galeorhinus galeus* (L.) Blainv.

26927. Santa Barbara, California.  
26973. Monterey, California.

| 27190. San Francisco, California.  
27391. " "

## CETORHINIDÆ.

244. *Cetorhinus maximus* (L.) Blainv.

27024. (Teeth and gill-rakers). Monterey, California.

## MYXINIDÆ.

245. *Polistotrema dombeyi* (Müller) Gill.

26995. Monterey, California.

UNITED STATES NATIONAL MUSEUM, January 14, 1881.

**DESCRIPTION OF A NEW SPECIES OF SQUALIUS (SQUALIUS ALICÆ), FROM UTAH LAKE.****By PIERRE LOUIS JOUY.***Squalius alicæ*, sp. nov.Allied to *Tigoma intermedia* Girard.

Body elongate, compressed posteriorly, the back gradually elevated from the snout to the dorsal. Dorsal and ventral outline similar. Greatest depth of body (at ventrals) equal to length of head. Lateral line complete, slightly decurved.

Head short, rather stout, its breadth equalling three-fifths its length, which is  $4\frac{1}{3}$  in the total without caudal. Snout rounded, jaws equal, maxillaries reaching to the vertical from the anterior margin of the orbit.

Eye moderate, its diameter contained four times in the length of the head. Scales minute, 18–80–15, of about equal size. The pectoral fin does not reach to the ventral, and equals the length of the head.

*Measurements*.—Length to base of caudal, .067<sup>mm</sup>; head, .016<sup>mm</sup>; depth at ventrals, .016<sup>mm</sup>; diameter of orbit, .004<sup>mm</sup>; mandible, .005<sup>mm</sup>; inter-orbital space, .0055<sup>mm</sup>; breadth of head, .009<sup>mm</sup>; pectoral, .016<sup>mm</sup>; longest dorsal ray, .014<sup>mm</sup>; longest ventral ray, .010<sup>mm</sup>; longest anal ray, .011<sup>mm</sup>. Caudal broken.

Radial formulæ: D. I, 8; A. I, 8; V. I, 7; P. 15.

Teeth, 2, 4–5, 1; strongly hooked, apparently without masticatory surface.

Color dark plumbeous above, with a median band of steel-blue extending along the sides of the body from the head to the caudal fin. Below the lateral line pinkish; cheeks silvery.

Five specimens, collected in Utah Lake by Prof. D. S. Jordan, are numbered in the United States National Museum 27412.

UNITED STATES NATIONAL MUSEUM, *January 14, 1881.*

**DESCRIPTION OF A NEW GOBIOID FISH (OTHONOPS EOS), FROM SAN DIEGO, CALIFORNIA.****By ROSA SMITH.***Othonops eos*, gen. et sp. nov.

One specimen of this interesting fish was collected for me by Mr. G. W. Dunn at Point Loma, San Diego County, California. It is found under large stones, and is of a bright pink color in life, fading to a dull yellowish white in spirits. This species is most closely related to *Cryptallogobius nilssoni* (Düb. & Kor.) Gill (*Gobiosoma nilssoni* Günther, Cat. Fishes Brit. Mus. iii, 86), a species found on the coast of Norway,

from which it is distinguished generically by the obsolete eyes, and specifically by the characters given in the following description:

Body elongate, posteriorly much compressed, not much depressed anteriorly. Head depressed, with the cleft of the mouth nearly horizontal and one-half the length of the head, the maxillary reaching a vertical line drawn across the probable position of the eye. Eyes invisible, covered by the skin; snout rounded; the jaws equal, or very nearly so, the lower jaw in a preserved specimen seeming to be very slightly produced. Both nostrils are provided with a flap.

A narrow band of villiform teeth in each jaw. The gill-membrane is united to the isthmus, and the branchial cleft is equal in length to the distance between the first and second dorsal fins, or one-tenth of the length (from snout to base of caudal).

A groove has its origin immediately in advance of first dorsal and extends medially nearly to tip of snout.

The first dorsal fin is composed of two flexible spines, and is equidistant between the snout and the base of the caudal fin; the insertion of the second dorsal is not much in advance of vent, while the insertion of the anal is opposite the fifth ray of the soft dorsal; the last rays of the posterior dorsal are slightly longer than its anterior one, and the fin terminates opposite the anal, which is similar to the soft dorsal. A very small anal papilla may be seen.

Vertical fins low; caudal small, pointed; ventrals forming a disk, which is not adherent to the belly; pectorals like the caudal in form, their free tips extending beyond the ventrals, though not approximating the first dorsal, and very remote from the vent.

Body entirely smooth, wholly free from scales, tubercles, or asperities of any kind.

The type specimen has been presented to the National Museum, where it is numbered 27466.

This species is doubtless the type of a distinct genus, which may be called *Othonops* (ὄθονος, veil; ὤψ, eye). This genus is distinguished from *Crystallogobius* by the concealed eyes, these organs being large and conspicuous in *C. nilssoni*, and possibly also by the absence of the sexual differences in dentition, so marked in *Crystallogobius*, the male of *C. nilssoni* being provided with strong canines. The remaining genera of *Gobiinae* have five or more dorsal spines, except *Benthophilus*, which, with three dorsal spines, has the skin verrucose.

Since the above was in type three more specimens have been obtained at the same locality, the measurements of the largest of which are included in the table below.

On examination of this specimen, 2¾ inches in length, I find further characteristics.

In this example, the fins are better preserved and show their normal form, the caudal and pectoral being rounded the pointed appearance of those fins on the type specimen probably having been caused by

their becoming shrivelled and dry before immersion in alcohol, the present individual having been placed in spirits when alive.

On the under side of the head the skin (in a preserved specimen) lies in irregular folds, which conform generally to the outline of the lower jaw, the outer folds reaching the gill-opening. Between the lower lip and these folds there is a series of papillæ, which has its origin a short distance behind the corner of the mouth, the series being slightly separated close behind the symphysis of lower jaw by two small, rounded flaps. The papillæ number about fourteen on either side of the flaps. On the superior surface of the snout, extending posteriorly half as far as the termination of the maxillary, the skin is finely wrinkled, and there is on either side a conspicuous flap, which seems to conceal a nostril.

The skin on the top of the head posterior to the wrinkled snout is smooth and adherent to the muscles. Checks tumid.

This species has the habit of burrowing into the sand on the removal of the stone covering it, and in one instance a lively individual buried itself in the sand a second time. It is of a clear pink color, shading into yellow on the tail, and has a semi-transparent appearance in life.

*Measurements.*

Locality.....	Point Loma, San Diego, Cal.		Point Loma, San Diego, Cal.	
	Inches and 100ths.	100ths of length.	Inches and 100ths.	100ths of length.
Extreme length .....	2. 25	.....	2. 75	.....
Length to base of caudal fin .....	2. 00	100	2. 38	.....
Body:				
Greatest height .....		19		22
Greatest width .....		13		15
Greatest circumference .....		48		60
Height at base of ventrals .....		14		17
Least height of caudal peduncle .....		10		9½
Length of caudal peduncle .....		10		6
Head:				
Greatest length .....		28		27
Greatest width .....		17		18
Width of interorbital area (ca.) .....		13. 5		.....
Branchial cleft .....		10		.....
Distance from snout to probable location of eyes .....		12		.....
Dorsal:				
Distance from snout .....		50		50
Height at last spine .....		10		.....
Length of base .....		23. 5		23
Anal:				
Distance from snout .....		70		74
Length of base .....		16		.....
Caudal:				
Length of middle rays .....		17		15
Pectoral:				
Distance from snout .....		32		30
Length .....		14		15½
Ventral:				
Distance from snout .....		29		26
Length .....		14		13
Dorsal .....		11, 11		.....
Anal .....		6 or 7		.....

SAN DIEGO, CAL., January 18, 1881.

## ON A DUCK NEW TO THE NORTH AMERICAN FAUNA.

By ROBERT RIDGWAY.

About nine years since (February 2, 1872), Mr. George A. Boardman, of Calais, Maine, sent to the Smithsonian Institution a mounted specimen of a duck obtained in Fulton Market, New York City, and supposed to have been shot on Long Island Sound, which he was unable to determine satisfactorily, but which he supposed to be a hybrid between the Red-head (*Aethya americana*) and some other species. The specimen was in immature plumage, with the feathers of the first livery much worn, while those of the new moult, which were generally interspersed, indicated a very different garb when the moult should have been completed. At the time the specimen was received at the Smithsonian, I (also supposing it to be a hybrid) made comparisons with nearly, if not quite, all the American species of ducks, but was unable to get the slightest clue to its parentage. It was then put back in the case and not again thought of until a few days ago, when in removing the specimens with a view to their rearrangement I happened to take the one in question in one hand and an adult female of the European Rufous-crested Duck (*Fuligula rufina*) in the other; and having the two thus in a very favorable position for comparison, I at once perceived a striking similarity in general appearance and in the form of the bill, which induced me to extend the examination to an adult male, the result being that no question remained of the bird in question being an immature male of *F. rufina*, a species hitherto not detected in North America. I have written to Mr. Boardman requesting full particulars as to circumstances and date of capture, but have been unable to elicit any further particulars than those given above.

As the species has never been described in any work on North American birds, I give below a description of the three stages represented in the collection of the United States National Museum, as well as of the downy young, the latter quoted from Dresser's "Birds of Europe"; also, the principal synonyms and references, compiled from the leading European authorities.

## Genus FULIGULA, Stephens.\*

"*Branta*," BOIE, Isis, 1822, 564 (type *Anas rufina*, Pall.); not of SCOPOLI, 1769.

*Fuligula*, STEPHENS, Gen. Zool. xii. 1824, 187 (type *Anas rufina*, Pall.).

*Netta*, KAUP, Nat. Syst. 1829, 102 (same type).

*Callichen*, BREHM, Vög. Deutschl. 1831, 921 (same type).

*Mergoides*, EYTON, Cat. Brit. B. 1836, 57 (same type).

CHAR.—Similar to *Fulix*, but the bill decidedly broader at the base than at any other part, gradually narrowing toward the end, which has

\* Some recent authorities have, with apparently a not very particular regard for structural characters, used the generic term *Fuligula* for the entire group of lobe-halluxed river-ducks, or those which have usually been assigned to the genera *Fuligula*, *Fulix*, and *Aethya*. But *Anas rufina*, Pall., upon which the genus *Fuligula* of Stephens



a large and very broad nail; maxilla very much depressed terminally, its depth at the base of the nail being only about one-fourth that at the extreme base. Male with the head rufous, the pileum ornamented with a very full, soft tuft or bushy crest, occupying the whole top of the head.

FULIGULA RUFINA (Pall.) Stephens.

*The Rufous-crested Duck.*

*Anas rufina*, PALL. It. ii. App. 1773, 731, No. 28.—GMEL. S. N. i. 1788, 541.

*Branta rufina*, BOIE, Isis, 1822, 564.—GRAY, Cat. Brit. B. 1863, 198.

*Fuligula rufina*, STEPH. Gen. Zoöl. xii. 1824, 188.—DRESSER, B. ENR. pt. xxii. Oct. 1873.

*Netta rufina*, KAUP, Nat. Syst. 1829, 102.

*Platypus rufinus*, BREHM, Vög. Deutschl. 1831, 922.

*Callichen rufinus*, BREHM, t. c. 924.

*Mergoides rufina*, EXT. Rar. Brit. B. 1836, 57.

*Aythya rufina*, MACGILL. Man. Brit. B. 1846, 191.

*Callichen ruficeps*, BREHM, t. c. 922.

*Callichen subrufinus*, BREHM, t. c. 924.

*Callichen micropus*, BREHM, t. c. 925.

*Callichen rufescens*, BREHM, Vogelfang, 1855, 379.

*Red-crested Pochard*, SELBY, Brit. Orn. ii. 350.—DRESSER, l. c.

*Red-crested Whistling Duck*, YARRELL, Brit. B. ed. 2, iii. 327, fig.; ed. 3, iii. 329, fig.—GRAY, l. c.

HAB.—Southern and eastern Europe, northern Africa, and India; occasional in northern and central Europe, and casual in the British Islands; accidental in eastern U. S. (New York market, Boardman; spec. in U. S. Nat. Mus.).

*Adult* ♂ (57207, U. S. Nat. Mus.; Hungary, W. Schlüter).—Head and upper half of the neck delicate pinkish cinnamon, or vinaceous-rufous, the full, soft crest (occupying the entire pileum) paler and less reddish, the feathers light buff at tips; lower half of the neck (including a narrow stripe which extends up the nape to the occiput), jugulum, breast, abdomen, anal region, crissum, upper tail-coverts, and rump brownish black, deepest on the neck and jugulum, and with a decided dark-green gloss on the upper tail-coverts. Back and scapulars uniform light umber-drab or isabella-color; wing-coverts and tertials brownish gray; speculum white basally, changing gradually into pale grayish, then succeeded by a rather broad subterminal bar of dusky, the tip narrowly and abruptly white; four outer primaries with outer ends dusky; inner quills pale ashy, with broad dusky ends; tail dull dark grayish. A broad bar or transverse patch across anterior scapular region, anterior border of the wing, lining of the wing, axillars, and a very large patch

was based, is quite a different type from *Fulix* (formally restricted to *F. marila* and its allies by Professor Baird, in 1858) and *Ethya*, and should, in my opinion, be separated generically. The first use of the term *Branta* in a generic sense was by Scopoli in 1769 (for *Anser bernicla*, L., *A. moschata*, L., *A. torrita*, L., *A. albifrons*, L.—a very heterogeneous assemblage, which invalidates its subsequent employment unless restricted to one or another of the species named by Scopoli not already been supplied with a generic name, of which, however, there appears to be none not thus provided.

covering the flanks and posterior half of the sides, pure white. "Bill bright vermilion-red, the tip white; irides reddish brown; legs orange-red. Total length 21 inches." (DRESSER, B. Eur. pt. xxii.) Wing, 10.20; culmen, 2.00; tarsus, 1.50; middle toe, 2.25.

*Adult* ♀ (57209, U. S. Nat. Mus.; Hungary, W. Schlüter).—Crest much less developed than in the male, light hair-brown, this color descending to the level of the lower border of the eye, and posteriorly continuing in a narrow stripe down the nape; rest of the head and neck very pale ashy, as are also the lower parts in general; jugulum, sides, and flanks light raw-umber brown, the tips of the feathers lighter; anal region and crissum uniform light drab, the latter whitish terminally. Upper parts in general umber-drab (the wings being more brownish than in the ♂), darker on the rump; white patch at base of scapular region wholly obsolete, and white border to the wing indistinct; speculum pale ashy, becoming gradually dull white basally, and brownish dusky subterminally, and with a narrow white terminal margin as in the ♂. "Eyes hazel; beak blackish, with a pink tip, a portion of the lower mandible being yellowish pink; legs and feet pinkish, webs blackish." (DRESSER, l. c.) Wing, 9.90; culmen, 1.90; tarsus, 1.50; middle toe, 2.20.

*Immature* ♂ (61957, U. S. Nat. Mus.; vicinity of New York City, Feb., 1872, G. A. Boardman).—Similar in general appearance to the adult ♀, as described above, but crest much less developed (the tips of the feathers much worn) and decidedly more reddish in color; sides and under parts of head thickly interspersed with cinnamon-colored feathers (new moult); the jugulum, breast, and posterior under parts also mixed with black feathers, indicating the approaching adult livery; white patch at base of scapular region plainly indicated, and broad white border to anterior portion of the wing very distinct; speculum much as in the ♀, lacking the distinct subterminal dusky bar of the adult ♂. Wing, 9.80; culmen, 1.80; tarsus, 1.50; middle toe, 2.15.

*Young in down* (fide *Baldamus*, Cab. Journ. 1870, 280).—Differs from every other duck in this plumage that I know in having a double olive-gray stripe from the lores, dividing before the eye, and bordering the yellowish-gray eyebrow above and the cheeks and auriculars below; upper parts, crown from the base of the bill, nape, back, and wings dull olive-gray, excepting the spot on the shoulder, which, with the rest of the body, is pale yellowish gray; iris dark brown; bill reddish brown, with the nail white; feet ash-gray, with a greenish tinge, webs and toes narrowly edged with yellowish white." (DRESSER, l. c.)

ON *AMAZILIA YUCATANENSIS* (CABOT) AND *A. CERVINIVENTRIS*,  
GOULD.

By ROBERT RIDGWAY.

In compiling the synonymy of *Amazilia cerviniventris*, in volume i of these Proceedings (pp. 148, 149), I united this species with *A. yucatanensis* (Cabot), on the strength of Mr. D. G. Elliot's opinion (see note on p. 149) that they were the same. The editors of "The Ibis," however, in that journal for April, 1879, p. 208, dissent from this determination, and suggest that "a comparison of the Texan specimens with Mexican examples of *A. cerviniventris* and this type [Cabot's type of *yucatanensis*] would be satisfactory, as Mr. Gould has always asserted that *A. yucatanensis* and *A. cerviniventris* are distinct species". Through Dr. Cabot's kindness I have been able to make a direct comparison of his type of *yucatanensis* and the Texan specimens, so called by me, and find that they are indeed quite distinct species, the latter being *A. cerviniventris* of Gould, and exactly like examples of that species from eastern Mexico.

*A. yucatanensis* is much darker colored throughout than *A. cerviniventris*, the green above inclining decidedly to coppery bronze, while the broad tips and margins to the rectrices are deep violet-dusky, instead of greenish or bronzy, little, if any, tinged with violet. The most important difference, however, consists in the coloration of the lower parts, the green of the jugulum ending very abruptly or giving place immediately to the deep cinnamon-rufous of the entire under surface, excepting the femoral tufts, which are white, as in other species of the genus. In *A. cerviniventris*, on the other hand, the green of the jugulum invades both the breast and sides, in the form of a more or less distinct spotting (which, however, grows gradually fainter posteriorly), the feathers of the breast and sides being light green bordered with pale cinnamon. The cinnamon-color of the belly, etc., is also very much paler than in *A. yucatanensis*, in which the tint is even rather deeper than in *A. cinnamomea*.

The following comparative diagnoses express more succinctly the differential characters of the two species:

- A. YUCATANENSIS.—Above greenish bronze, changing to coppery; ends and edges of rectrices dark violet-dusky; green of the jugulum giving way immediately and very abruptly to the deep cinnamon-rufous of the breast, sides, etc.
- A. CERVINIVENTRIS.—Above metallic grass-green, varying to bronze-green in certain lights; ends and edges of rectrices greenish bronze, or dull bronze, rarely tinged with violet; green of the jugulum invading the breast and sides, in the form of more or less distinct spots, growing gradually fainter posteriorly, the remainder of the under parts much paler cinnamon.

The measurements of the two species appear to vary but little, the four examples of *A. cerviniventris* now before me ranging in length of wing from 2.15 to 2.30 inches, while the type of *A. yucatanensis* measures 2.20; the length of tail in the latter is 1.60, and in the former series varies from 1.50 to 1.70. The culmen ranges from .70 to .80 in *cerviniventris*, but the bill of the type of *yucatanensis* is unfortunately broken, so that its length cannot be ascertained.

*A. cerviniventris* appears to be exclusively an eastern species (as are also *A. yucatanensis* and *A. fuscicaudata*), its habitat extending from southeastern Texas to Vera Cruz, and perhaps also to Yucatan, since Mr. Elliot (Synopsis, p. 219) states that he "can perceive no difference between Mexican and Yucatan specimens". The *A. cinnamomea* appears to be wanting from eastern Mexico, but in the collection of the National Museum are specimens from Mazatlan, Tehuantepec, and Yucatan, besides San Salvador and Nicaragua, though Mr. Elliot gives only "Guatemala and Costa Rica" as its habitat.

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**DESCRIPTIONS OF NEW SPECIES OF FISHES (URANIDEA MARGINATA, POTANOCOTTUS BENDIREI) AND OF MYCTOPHUM CRENULARE J. AND G.**

**By TARLETON H. BEAN.**

The first two species here mentioned as undescribed formed part of a collection received from Capt. Charles Bendire, U. S. A. Several other species received at the same time are retained for study and comparison with fuller material promised from the same source.

The *Myctophum* was obtained by Mr. W. H. Dall, in the Pacific, off Puget Sound.

*Uranidea marginata*, n. s.

24197; 9 specimens; tributaries of Walla Walla River; Capt. Charles Bendire, U. S. A.

B. VI; D. VII-VIII, 18-19; A. 15-14  $\frac{1}{2}$ ; V. I, 3; P. 13-14; C. 14-15.

This species is allied to *Cottus cognatus* Rich., but differs from that species in having the vent nearer to the insertion of the caudal than to the snout, while the origin of the anal falls in the vertical from the third dorsal ray instead of the sixth, as in Richardson's species. The ventral has 1 spine and 3 rays (*C. cognatus* has 1 spine and 4 rays). The longest pectoral rays are shorter than the head (equal to the head in *cognatus*).

Head broad, slightly depressed, its greatest length contained a little more than 3 times in length of body without caudal (4 times in total length); distance from tip of snout to eye equals length of eye, which is  $\frac{1}{4}$  of length of head. Vomerine teeth; none on the palatines. Body stout anteriorly, moderately compressed posteriorly, its height at origin of first dorsal equal to its width at the same place, and contained  $4\frac{1}{2}$  times in length of body without caudal; the least width of the caudal peduncle



less than  $\frac{1}{2}$  its height. The distance between the eyes equals  $\frac{1}{2}$  of their long diameter. The maxilla extends to the vertical through the end of the anterior third of the orbit. The preoperculum has a short, broad, rather blunt spine at its angle and a much smaller one on its lower limb; between these two the margin in some specimens is crenulated, sometimes forming an additional blunt spine. The preopercular spines are all hidden under the skin.

The distance of the first dorsal from the snout is contained  $2\frac{2}{3}$  times in length of body without caudal; its longest spine is  $\frac{1}{3}$  as long as the head; the length of its base is contained 5 times in length of body without caudal, 6 times in total length; the length of the second dorsal base is  $\frac{1}{3}$  of total length. The length of the anal base is  $\frac{1}{3}$  of length without caudal. The length of the ventral is contained from 6 to  $6\frac{1}{2}$  times in the total length. The length of the pectoral is  $\frac{1}{4}$  of length of body without caudal.

The colors have faded, but the ground color seems to be plumbeous, with occasional blotches of darker. The fins are more or less distinctly punctulated. The first dorsal is darker than the body and has a distinct white margin.

**Potamocottus Bendirei**, n. s.

The type of this species, catalogue No. 24196, was collected by Capt. Charles Bendire, U. S. A., in Rattlesnake Creek, near Camp Harney, Oregon, May 2, 1878. I take pleasure in dedicating the species to this excellent collector and observer, who has contributed so much to the Museum.

DESCRIPTION.—The length of the type is 2.7 inches (69<sup>mm</sup>) to base of caudal. The greatest height of the body at the origin of the dorsal equals its greatest width over the base of the pectorals, and is contained nearly 4 times in its length without caudal. The least height of the tail is  $\frac{1}{12}$  of the length without caudal. The length of the middle caudal rays is contained  $4\frac{1}{2}$  times in length of body.\* Width of the mouth equals  $\frac{1}{2}$  the length of the head.

The maxillary extends a little behind the front margin of the eye. The snout is as long as the eye. The distance between the eyes is less than their diameter, and is contained 5 times in the length of the head; the diameter of the eye 4 times. The length of the lower jaw equals  $\frac{1}{2}$  the length of the head. Preoperculum armed with 4 spines; the largest is at the angle, and is about  $\frac{1}{2}$  as long as the eye; the 3 anterior ones are very small and hidden by the skin. The distance of the spinous dorsal from the snout is  $\frac{1}{3}$  of the length of the body; the length of the longest spine of the first dorsal is about  $\frac{1}{3}$  of that of the head and about  $\frac{2}{3}$  of the longest dorsal ray. The longest dorsal and anal rays are equal. The length of the anal base almost equals the length of the head. The length of the second dorsal base is a little greater than the length of the head.

\* Length of body here means length without caudal.



The pectorals reach to the origin of the anal; ventrals do not reach to the vent.

Vomerine and palatine teeth present. Skin smooth.

*Radial formula*: B. VI; D. VIII, 16; A. 12; V. I, 3; P. 15; C. 15.

*Color*: Uniform dark brown above, lighter on the throat and belly.

*Myctophum crenulare*, J. & G.

The museum has an additional specimen of this species, which was washed aboard a United States Coast Survey vessel commanded by Mr. William H. Dall, in N. lat.  $49^{\circ}$ , W. long.  $151^{\circ}$ . It was collected by Mr. W. G. Hall. The specimen is numbered 23945 in the National Museum Fish Catalogue.

**DESCRIPTION.**—D. I, 11; A. I, 16; P. 13; V. 7; scales  $2\frac{1}{2}$ –45–6 $\frac{1}{2}$ .

The basis of comparison for the measurements of different parts of the body is the total length without caudal. The greatest height of the body is contained 4 times in this length, the length of the head  $3\frac{2}{3}$  times; the least depth of the tail equals  $\frac{1}{4}$  of the height of the body at the ventrals, height of the head nearly equal to its length without snout. Eye large, its diameter being more than the interorbital distance, and contained 3 times in the length of the head. Posterior margin of the preoperculum oblique. Snout very short and obtuse, about  $\frac{1}{3}$  as long as the eye. The maxillary is  $\frac{2}{3}$  as long as the head, scarcely dilated posteriorly; it reaches almost to the posterior margin of the preoperculum. The origin of the dorsal fin is equally distant from the tip of the snout and the root of the caudal, and is about over the tips of the extended ventrals; it is about in the vertical through the sixteenth scale of the lateral line; its last ray is over the twenty-fifth scale of the lateral line and the eighth anal ray. The pectorals are imperfect, but they apparently do not extend much beyond the origin of the ventrals. Scales coarsely denticulated, some of them showing about 6 teeth on their free margin; those on the lateral line are conspicuously the largest. Lower parts with a double series of pearl-colored spots, besides a few isolated ones.

*Measurements.*

Current number of specimen.....	{ (716) 23945. Lat. $49^{\circ}$ N., Long. $151^{\circ}$ W., Sept. 15, 1871.	
Locality .....		
	Milli- meters.	100ths of length.
Length to origin of middle caudal rays.....	59	100
Body:		
Greatest height.....		25
Greatest width.....		9
Height at ventrals.....		24
Least height of tail.....		6
Length of caudal peduncle.....		20

Measurements—Continued.

Current number of specimen.....	{	(716)
Locality .....		23945. Lat. 49° N., Long. 151 W., Sept. 15, 1871.
	Milli-	100ths
	meters.	of
		length.
Head:		
Greatest length.....		27½
Greatest width.....		10
Width of interorbital area.....		7
Length of snout.....		3½
Length of maxillary.....		18
Length of mandible.....		18½
Diameter of orbit.....		9
Dorsal (first):		
Distance from snout.....		52
Length of base.....		17
Length of longest ray.....		15
Dorsal (soft):		
Distance from snout.....		78
Length of longest ray.....		7½
Anal:		
Distance from snout.....		56
Length of base.....		23
Length of longest ray.....		15
Pectoral:		
Distance from snout.....		26
Length.....		14
Ventral:		
Distance from snout.....		37
Length.....		12
Dorsal.....	I, 11	
Anal.....	I, 16	
Pectoral.....	13	
Ventral.....	7	
Number of scales in lateral line.....	45	
Number of transverse rows above lateral line.....	2½	
Number of transverse rows below lateral line.....	6½	

NOTES ON THE FISHES OF THE PACIFIC COAST OF THE UNITED STATES.

By DAVID S. JORDAN and CHARLES H. GILBERT.

It is the purpose of this paper to present a list of the species of fishes known to occur along our Pacific coast, between the Mexican boundary and the boundary of British Columbia, together with notes on the distribution, habits, size, value, etc., of each species, in advance of the publication of a general descriptive work. The paper is to be considered mainly in the light of a contribution to our knowledge of the geographical distribution of fishes. The "common names" here given are, in all cases, those heard by the writers among the fishermen on different parts of the coast.

Family BRANCHIOSTOMATIDÆ.

1. *Branchiostoma lanceolatum* (Pallas) Gray.

Obtained by Dr. J. G. Cooper in San Diego Bay. Not seen by us.

Family MYXINIDÆ.

2. *Polistotrema lombeyi* (Müller) Gill.—*Lamperina*; *Hag*; *Eel*.

Santa Barbara (*vide* J. Weinmiller) to Eel River (Lockington). Very abundant in the Bay of Monterey, but not taken elsewhere by us. It

fastens itself usually on the gills or isthmus of large fishes, sometimes on the eyes, whence it works its way very rapidly into the inside of the body. It then devours all the flesh of the body without breaking the skin, so that the fish is left a mere hulk of head, skin, and bones. It is especially destructive to fishes taken in gill-nets. In every gill-net set at Monterey in summer, more or less of these empty shells are obtained. When these are taken from the water the hag-fish scrambles out with great alacrity. It is thought by the fishermen that the hags enter the fish after the latter are caught in the gill-net, and that they will devour a fish of 10 or 15 pounds weight in a single night. At any rate, large fishes of even 30 pounds are often brought up without flesh and without viscera, and we can hardly suppose that they swim about in the sea in this condition before coming into the gill-nets. The fish chiefly eaten are *Sebastichthys pinniger*, *miniatus*, *mystinus*, etc., *Ophiodon elongatus*, *Paralichthys maculosus*, and *Rhacochilus toxotes*.

The hag-fish reaches a length of 14 inches, and is not used as food.

The genus *Polistotrema* (Gill, MSS.) is distinguished from *Heptatrema* (*Bdellostoma*) by the presence of 11 or 12 gill-openings instead of 7.

#### Family PETROMYZONTIDÆ.

##### 3. *Ammocetes plumbeus* (Ayres) J. & G.

San Francisco northward; seen by us at Seattle and San Francisco. Nothing especial known of its habits, but it doubtless ascends most of the coast streams in spring. It reaches a length of 8 inches, and is not brought into market except when accidentally mixed with other species.

##### 4. *Entosphenus tridentatus* (Richardson) Gill.—*Lamprey*; *Lamperina*.

(*Petromyzon lividus*, *ciliatus*, *tridentatus*, and *astori* Girard.)

Monterey Bay to Puget Sound; seen by us at Santa Cruz and Astoria. It ascends the fresh waters in the spring to spawn, running in the Columbia in June. It reaches a length of more than 2 feet, and becomes very fat. It is never used as food so far as we know.

#### Family NOTIDANIDÆ.

##### 5. *Notorhynchus maculatus* Ayres.

From Monterey to Puget Sound. In Humboldt Bay it is extremely abundant, and it is much sought for the oil.

##### 6. *Hexanchus corinus* Jordan & Gilbert.—*Shovel-nosed Shark*.

Monterey to Puget Sound; probably not uncommon. A fine example obtained at Neah Bay (Cape Flattery) by James G. Swan. Another taken by us at Soquel.

#### Family HETERODONTIDÆ.

##### 7. *Heterodontus francisci* (Girard) Duméril.—*Leopard Shark*; *Bull-head Shark*.

From Point Concepcion southward. Described by Girard from Monterey, but not seen by us there, and probably very rarely or never reach-

ing San Francisco. Abundant at San Pedro and San Diego and not rare at Santa Barbara. It lays its eggs in January. They are enveloped in large cylindrical egg-cases, which are spirally twisted and without tentacles. This shark reaches a length of  $2\frac{1}{2}$  feet, and is used for no purpose.

#### Family SCYLLIIDÆ.

##### 8. *Catulus ventriosus* (Garman) J. & G.—*Ground Shark*; *Puffer Shark*.

From Monterey Bay southward. Abundant at Santa Barbara in winter, where it lives in the kelp, and is taken in large numbers in lobster-pots set for the "crawfish" (*Panulirus interruptus*), it being very fond of the salt fish used as bait. It is rarely taken in the summer, and it perhaps visits shallow water in the spawning season only, retiring to deeper water in summer. The egg-cases are extruded in February. They are flattish, oblong, quadrangular, with very long tentacles at the angles. This shark reaches a length of  $2\frac{1}{2}$  feet, and is valueless. It is remarkable for its habit of inflating its body by swallowing air, like a *Tetrodon*.

#### Family GALEORHINIDÆ.

##### 9. *Mustelus hinnulus* (Blainville) J. & G.—*Dog Shark*.

(*Mustelus californicus* Gill.)

From San Francisco southward. Very abundant at San Pedro and San Diego, living chiefly in bays and lagoons and feeding upon crustacea and small fish. It has very little oil in its liver, and is used only for crawfish bait and similar purposes. The young are sometimes salted and dried by the Chinese, tied in bundles, and shipped inland to the Chinese laborers on the railroads. They are not much valued even by them.

Most of the specimens seen were 2 to  $2\frac{1}{2}$  feet in length, but two adult females seen at San Pedro were 5 feet long and weighed about 40 pounds each.

##### 10. *Rhinotriacis henlei* Gill.—*Dog Shark*.

Humboldt Bay to Monterey. Two adults  $2\frac{1}{2}$  feet long, with the young inside and nearly ready for delivery, were taken at Monterey in April. The embryo is connected to the uterus by a placenta, as in *Rhinotriacis* (*Pleuraeromylon*) *lævis*, with which the present species is doubtless congeneric. Many young examples about a foot long were obtained of the Chinese fishermen at Potrero, near San Francisco, in August, and numerous others were seen in Humboldt Bay. This species is chiefly used for bait.

##### 11. *Triacis semifasciatus* Girard.—*Leopard Shark*; *Catfish*; *Cat Shark*.

From Cape Mendocino southward; very abundant in all bays and along sandy shores. The adults enter the lagoons in summer to bring forth their young, and hundreds of them are sometimes taken at once



with the seine. It reaches a length of about 3 feet and a weight of 25 pounds. It yields but very little oil, and is considered wholly worthless by all fishermen.

**12. Galeorhinus galeus** (Linnaeus) Blainville.—*Oil Shark; White Shark.*

From Cape Mendocino southward; very abundant everywhere in bays and lagoons during the summer. It brings forth its young from May to August, entering shallow bays for this purpose. It is taken in large numbers for its fins and its oil at Soquel, Monterey, and especially at Westminster and Newport, in Los Angeles County. It is usually taken with hook and line, herring and other silvery fish being the best bait. It reaches a length of 5 or 6 feet and a weight of 50 pounds, although most of those taken range from 30 to 40. A single liver makes three-fourths to one gallon of oil. The pectoral, dorsal, and caudal fins are taken off and dried in the sun. The Chinese buy these at about 15 cents a pound when dried. They strip off the skin and remove the fleshy part, and the gelatinous rays of the fin are valued by them very highly for soup, selling when prepared at about \$1.50 per pound. The fins of no other American shark are considered valuable by the Chinese.

**13. Galeocerdo tigrinus** Müller & Henle.—*Man-eater Shark.*

From San Diego southward. The jaws of a large example taken near San Diego were seen.

**14. Carcharhinus glaucus** (Linnaeus) Jordan & Gilbert.—*Blue Shark.*

A young specimen taken near San Francisco is in the Museum of the California Academy of Sciences, and the jaws of an adult taken near Seattle are in the Museum of the University of Washington Territory.

**15. Eulamia lamia** (Risso) Gill.—*Bay Shark.*

A partially grown specimen and the jaws of an adult individual obtained at San Diego.

Family SPHYRNIDÆ.

**16. Sphyrna zygaena** (Linnaeus) Rafinesque.—*Hammer-head Shark.*

A specimen of this species was obtained by Dr. J. G. Cooper at San Pedro, and sent to the United States National Museum.

Family ALOPIIDÆ.

**17. Alopias vulpes** (Gmelin) Bonaparte.—*Thresher.*

Occasionally taken at San Francisco and in Monterey Bay. Probably most abundant at Soquel, but seen by us only at Monterey.

Family LAMNIDÆ.

**18. Lamna cornubica** (Linnaeus) Müller & Henle.

A single specimen obtained at San Francisco. Another was taken last year at Santa Cruz, and a drawing of it made by Dr. C. L. Anderson.



19. *Isurus* (? *oxyrhynchus* Rafinesque).

Two jaws of a species of *Isurus*, supposed to be *I. oxyrhynchus*, were obtained at San Pedro.

20. *Carcharodon carcharias* (L.) J. & G.—*Man-eater Shark*.

Occasionally taken about Monterey Bay. One of 24 feet in length taken at Carmelo this year, and one of 20 feet at Soquel. One taken a few years ago at Soquel had a young sea-lion weighing 100 pounds in its stomach. It is valued only for the oil in its liver.

## Family CETORHINIDÆ.

21. *Cetorhinus maximus* (Linnaeus) Blainville.—*Ground Shark*.

Occasionally taken about Monterey by the whalers, and sometimes entangled in gill-nets. About five taken during the present year at Soquel and Monterey, ranging from 26 to 31 feet in length. It is valued for the oil in its enormous liver.

## Family SCYMNIDÆ.

22. *Somniosus microcephalus* (Bloch) Gill.—*Ground Shark*.

From Puget Sound northward; not rare. Often taken on trawl-lines set for dog-fish. A specimen 8 feet in length seen by us at Victoria. The livers are used with those of the dog-fish for making "dog-fish oil". In habits this species is very sluggish, lying "on the water like a log".

## Family SPINACIDÆ.

23. *Squalus acanthias* Linnaeus.—*Dog-fish*; *Spinarola*.

From Santa Barbara to Alaska; occasional southward; excessively abundant from Puget Sound northward. It lives especially in deep or quiet bays or channels, coming into shallower water in pursuit of herring or salmon. It feeds chiefly on herring, but will take any bait, even its own young. It is caught in great numbers with trawl-lines for its oil, both by white men and Indians. It reaches a length of about 3 feet. The young are brought forth in June in Puget Sound.

## Family SQUATINIDÆ.

24. *Squatina angelus* Duméril.—*Angel-fish*; *Anglo*; *Squat*.

From San Francisco southward; not uncommon. Seen by us at Soquel, Monterey, Santa Barbara, San Pedro, and San Diego. It reaches a length of nearly 5 feet and a weight of 60 pounds. It is not used for any purpose.

## Family TORPEDINIDÆ.

25. *Torpedo californica* Ayres.

Not common. Seen by us only at Soquel and San Francisco. It reaches a length of at least 2½ feet and a weight of nearly 50 pounds.

## Family RHINOBATIDÆ.

26. *Rhinobatus productus* Ayres.—*Guitar*; *Shovel-nosed Shark*.

From Cape Mendocino southward; exceedingly abundant from Santa Barbara to San Diego, inhabiting sandy shores. It brings forth its young in August. It reaches a length of 3 feet and a weight of 15 pounds. The tails of moderate-sized specimens are eaten by the Chinese and Mexicans, although little valued by either. The body is sometimes used for lobster bait.

27. *Platyrrhinoidis triseriatus* (Jordan & Gilbert) Garman.

From San Francisco southward; generally abundant, with the preceding. It is viviparous, bringing forth its young in August, 4 to 6 in each ovarial sac. It reaches a length of 20 inches and a weight of 4 to 5 pounds. It is used for no purpose.

28. *Syrrhina exasperata* (Jordan & Gilbert) Garman.

Seen by us at San Diego only, where half-grown specimens are very abundant. No adults have been seen by us, but it will probably be found to be a viviparous (and therefore Rhinobatoid) species. It is not used as food.

## Family RAIDÆ.

29. *Raia stellulata* Jordan & Gilbert.

Seen by us only in the Bay of Monterey, where it is very abundant in the winter and spring. Both adults and young are taken in great numbers in the gill-nets. It reaches a length of 30 inches. It is never sent to market, its dark color and very rough skin rendering it unsalable, the conventional ray being light brown and nearly smooth.

30. *Raia rhina* Jordan & Gilbert.

From Monterey to Vancouver's Island; less common than the others, but not rare. It reaches a length of 32 inches. In the neighborhood of San Francisco it is sent to the city markets with *R. binocularis* and *R. inornata*; elsewhere it is rarely eaten.

31. *Raia inornata* J. & G.—*Ray*; *Skate*; *Raic*.

Very abundant about San Francisco and Monterey, where it is taken in gill-nets and seines. It reaches a length of 24 to 30 inches. It is brought into the San Francisco market in large numbers from the immediate vicinity, never being shipped from any considerable distance. The pectoral fins are alone eaten, and these chiefly by the French.

At Santa Barbara a variety or subspecies (var. *inermis*) of this form occurs in some abundance. It is similar in size and appearance, but has the spines and armature of the body and tail very little developed.

32. *Raia binoculara* Girard.—*Skate; Ray.*( *Raia cooperi* Grd.)

From Monterey to Alaska; everywhere common: the largest and most abundant skate on the coast. It frequents bays and sandy shores, and is taken with nets or hooks. It feeds on crustaceans and fishes. Two specimens of *Cottus polyacanthocephalus*, each a foot long, were found in the stomach of one of these skates. The egg-cases are laid in July. They are quadrate, with very short tentacles, and are nearly a foot in length. *Raia binoculara* reaches a length of 5 to 6 feet and a weight of more than 60 pounds. It is generally the commonest species in the markets of San Francisco; elsewhere it is rarely used for food, and its liver yields but very little oil.

## Family TRYGONIDÆ.

33. *Urolophus halleri* Cooper.—*Round Sting Ray.*

From Point Concepcion southward; excessively abundant in the bays and lagoons. The bottom of portions of San Diego Bay is literally lined with these rays, who lie on the bottom nearly buried in loose sand or mud. This is the smallest, most abundant, and most dangerous of the sting-rays, striking quickly and accurately with its muscular tail. One taken in a net struck at another, the sting passing entirely through the body of the latter. This species reaches a length of 18 inches, and is never eaten.

34. *Pteroplatea marmorata* Cooper.—*Ray.*

From Santa Barbara southward; common in bays and along sandy shores. It reaches a length of  $1\frac{1}{2}$  feet, the breadth being about  $2\frac{1}{2}$ . It is not usually recognized as a sting-ray, and is, therefore, frequently used as food, the larger ones taken at San Pedro being shipped to Los Angeles, where they are eaten by the French as *Raie*.

35. *Dasybatus dipterurus* Jordan & Gilbert.

Abundant in San Diego Bay; not seen elsewhere. It reaches a length of nearly 3 feet, exclusive of the tail. It is not used as food.

## Family MYLIOBATIDÆ.

36. *Myliobatis californicus* Gill.—*Stingaree; Sting Ray.*( *Rhinoptera respertilio* Grd.)

From Cape Mendocino southward; very abundant, especially about San Diego. Like the other species of sting-rays, it feeds on fishes and crustacea, and takes the hook readily. Its young are brought forth in July. It reaches a weight of 60 pounds or more, and is sometimes brought into the market of San Francisco.

37. *Aëtobatis laticeps* Gill.

California and southward; not obtained by us.

## Family CEPHALOPTERIDÆ.

38. *Manta birostris* (Walbaum) Jordan & Gilbert.*(Ceratoptera rampyrus* Anct.)

We are informed on good authority that one or more individuals of this gigantic species have been taken by whalers near San Diego.

## Family CHIMÆRIDÆ.

39. *Chimæra colliæi* Bennett—*Rat-fish*.

From Monterey northward; extremely abundant everywhere along the coast in deep bays. It feeds on fish, etc., and takes the hook very readily. It lays its eggs in July, the egg-cases being long and slender, without tentacles. It reaches a length of nearly 2 feet and a weight of 6 to 8 pounds. It is not used for any purpose. The liver is extremely large and fat, and it is said that the oil it yields is superior to any sort of shark-oil, but the fish is too small for its pursuit to be profitable.

## Family ACIPENSERIDÆ.

40. *Acipenser transmontanus* Richardson.—*White Sturgeon*; *Common Sturgeon*.*(Acipenser brachyrhynchus* and *acutirostris* Ayres.)

Common in the bays and large rivers from San Francisco northward, great numbers being taken in the Sacramento, Columbia, and Frazer's Rivers. It feeds on crustacea, etc., and in Frazer's River gorges itself on the eulachon. It runs up the rivers with the salmon in the spring, and probably spawns in the summer. It reaches a length of 8 to 15 feet and a weight probably of 300 to 400 pounds. It is largely used as food, although very cheap. In the restaurants it is usually called "sea-bass". Many sturgeons are smoked and caviar is made from the roe.

41. *Acipenser medirostris* Ayres.—*Green Sturgeon*.*(Acipenser acutirostris* Gthr. non Ayres.)

This species is found in the same waters as the preceding, but is much less abundant. It reaches probably a similar size. It is not used as food, being reputed "poisonous" by the fishermen. Seen by us at San Francisco and Astoria.

## Family MURÆNIDÆ.

42. *Muræna mordax* Ayres.—*Conger Eel*; *Congaree*.

From Point Concepcion southward; abundant about all the Santa Barbara Islands. It lives among rocks near low-tide mark and takes the hook readily. It may sometimes be found on land at low tide. It is extremely pugnacious, "striking from the shoulder" like a snake. It reaches a length of about 5 feet and a weight of 15 to 20 pounds. It is used as food and the flesh is very fat, resembling that of *Anguilla*. Its skin is said to be poisonous ("very pizen") by the fisherman.

## Family ANGUILLIDÆ.

43. *Myrichthys tigrinus* Girard.

Recorded from Adair Bay, Oregon; unknown to us.

44. *Ophichthys triserialis* (Kamp) Gthr.

Dr. Cooper informs me that he has taken this species on the coast. A specimen from Lower California (the type of "*Ophisurus californiensis*" Garrett) is in the Museum of the California Academy of Sciences.

## Family NEMICHTHYIDÆ.

45. *Nemichthys avocetta* Jordan & Gilbert.

A single specimen, 22 inches in length, was taken at Port Gamble, in Puget Sound, and presented to the National Museum by President Anderson, of the University of Washington.

## Family ALBULIDÆ.

46. *Albula vulpes* (Linnaeus) Goode.

Rather common in San Diego Bay, running in schools. It spawns late in summer. It reaches a length of about a foot. It is sold with the mullet when taken, and from its bright silvery coloration meets with a ready sale. It is, however, dry and bony, and but indifferent food.

## Family CLUPEIDÆ.

47. *Clupea mirabilis* Girard.—*Herring*.

Everywhere exceedingly abundant along the whole coast, especially northward; found south of Point Concepcion in winter only. At San Diego it spawns in January; further north much later. It is similar in size and value to the Atlantic herring, and, like it, is largely smoked or salted. The price in spring and summer is usually very low.

48. *Clupea sagax* Jenyns.—*Sardine*; *Sadina*.

Whole coast; very abundant southward, especially in winter. It is most common at San Diego, where it is taken with hook and line from the wharves. It reaches a length of about 9 inches, and is considered a rather better food-fish than the herring. No attempts have yet been made to put up this species in oil.

## Family ENGRAULIDÆ.

49. *Stolephorus compressus* (Girard) J. & G.—*Sprat*.

San Pedro and San Diego Bays; very abundant, but less so than the other species. Not seen northward. It reaches a length of about 6 inches. It is not worth much as food, the flesh being full of small, stiff bones.



50. *Stolephorus delicatissimus* (Girard) J. & G.

San Diego Bay; very abundant. Not seen elsewhere. A small species, reaching a length of less than 3 inches.

51. *Stolephorus ringens* (Jenyns) J. & G.—*Anchovy*.

Abundant in clear bays for the entire length of the coast. It reaches a length of about 6 inches, and it often comes into the markets. Its chief use is, however, as bait for flounders and rock-cod. The Chinese salt them in barrels for that purpose. It is sometimes pickled with spices by the Germans, and sold as "Norsk Anchovy".

## Family SALMONIDÆ.

52. *Salvelinus malma* (Walb.) J. & G.—*Dolly Varden Trout*; *Bull Trout*; *Salmon Trout*.

(*Salmo spectabilis* Grd.; *Salmo campbelli* Suckley; *Salmo lordi* Günther; *Salmo tudes* Cope; *Salmo callarias* Pallas; *Salmo bairdi* Suckley.)

Abundant in lakes and streams of the Cascade Range from Mount Shasta northward to Alaska. Large numbers are found in the salt waters of Puget Sound, where they are taken in seines and with hook and line.

In the mountains it is usually quite small; in the lakes larger. At Seattle and in Frazer's River it often reaches a weight of 12 pounds. It is an excellent food-fish. It feeds on sticklebacks (salmon-killers), herrings, and other small fish.

53. *Salmo irideus* Gibbons.—*California Brook Trout*; *Rainbow Trout*.

From Mount Shasta to San Luis Rey River, in streams of the Coast Range and west slope of the Sierra Nevada. Less common north of California, and seldom seen in salt water. It is not often sent to the market of San Francisco. It seems to be much smaller in size than the other species of the coast, rarely becoming more than 18 inches in length. The largest specimens seen are from McCloud River, and very deep bodied.

54. *Salmo gairdneri* Richardson.—*Steel-head*; *Hard-head*; *Black Salmon*.

(*Salmo truncatus* Suckley.)

Found in the mouths of the large rivers from the Columbia northward, and occasionally in the Sacramento. It appears with the salmon and is usually thought to be migratory, but is probably not so, or migratory to a small degree. It spawns later than the salmon, and most of the individuals taken during the time of the salmon run in the spring are spent, and their flesh is of no value. In other rivers than the Columbia, and at other seasons it is esteemed an excellent food-fish. Its length is about that of an ordinary Quinmat salmon; the body is less deep and the tail heavier. The usual weight is from 14 to 18 pounds. It is never canned, as the flesh is pale and grows paler when boiled, and the bones are firm and stiff.

55. *Salmo purpuratus* Pallas.—*Oregon Brook Trout*; *Salmon Trout*; *Lake Trout*.  
(*Salmo clarki* Rich.)

Very abundant in all waters north of Mount Shasta and through the Great Basin and Rocky Mountain region; occasional southward to Santa Cruz. Found in abundance in salt water in Puget Sound and about the mouth of the Columbia. It is usually seen of but 2 to 8 or 10 pounds in weight, but occasional specimens weighing as much as 25 pounds are taken in the Columbia in summer (*U. J. Smith*). These latter are known usually as steel-heads, although the common steel-head is *S. gairdneri*; the young as brook-trout, and the partly grown as salmon-trout. This is the most widely distributed of our trout, and it is subject to many variations.

56. *Oncorhynchus kisutch* (Walb.) J. & G.—*Coho Salmon of Frazer's River*; *Silver Salmon*; *Kisutch*; *Bielaya Ryba*. Skewitz.

Sacramento River to Puget Sound and northward; very abundant in summer and fall. It is rarely taken in the Columbia in the spring, but great numbers run up the river in the fall. It is one of the smallest of the salmon, reaching a length of about 30 inches and a weight of 4 to 8 pounds. As a food-fish it ranks with the young of *O. chouicha*, which it much resembles. It may be readily distinguished by the few (40–50) pyloric cæca. In *O. chouicha* there are about 180 pyloric cæca. In fall the males become greatly distorted and hook-jawed, and specimens in every stage can be found in late summer.

57. *Oncorhynchus chouicha* (Walb.) J. & G.—*Quinnat Salmon*; *King Salmon*; *Chouicha*; *Chinook Salmon*; *Spring Salmon*; *Columbia River Salmon*; *Sacramento Salmon*; *Winter Salmon*; *White Salmon*. Sawkwey.

From Ventura River northward to Behring's Straits, ascending Sacramento, Rogue's, Klamath, Columbia, and Frazer's Rivers in spring, as well as the streams of Alaska, Kamtschatka, Japan, and Northern China; in fall ascending these and probably *all* other rivers in greater or less abundance; the young taken in Monterey Bay, Puget Sound, etc., in summer in considerable numbers. This salmon, by far the most important fish in our Pacific waters, reaches a weight of about 70 pounds. The average in the Columbia River is about 22 pounds; in the Sacramento River about 18; in other rivers usually still smaller.

58. *Oncorhynchus nerka* (Walbaum) Gill & Jordan.—*Blue-back*; *Sukkeye*; *Red-fish*; *Rascal*; *Frazer's River Salmon*; *Krasnaya Ryba*.

From Columbia River to the Aleutian Islands; the principal salmon of Frazer's River; unknown in Eel River, Rogue River, and in the Sacramento. In the Columbia River it is much less abundant than the Quinnat salmon, and its flesh is less firm and paler. It reaches a weight of 5 to 8 pounds, four "blue-backs" being counted at the canneries equal to one Chinook salmon. It runs chiefly in the spring, few of them being seen on Frazer's River or the Columbia in the fall. Like the Quinnat it ascends streams to great distances. It is known in the

fall as red-fish. In the upper courses of the Columbia and Frazer's River, this species and the preceding are the only salmon found. The blue-back, in all its protean forms, can readily be distinguished by the much longer and more numerous gill-rakers.

**59. *Oncorhynchus keta* (Walb.) G. & J.—Dog Salmon; Quarlisch; Kayko; Le Kai.**

San Francisco to Behring's Straits; very abundant in the fall, when it runs in all streams, but not to a great distance. Not seen by us anywhere in the spring. It reaches a weight of 12 to 20 pounds. As it is taken only in fall, after the development of the organs of generation has caused the deterioration of the flesh, it has little economic value. Considerable numbers are salted or dried by the Indians.

**60. *Oncorhynchus gorbuscha* (Walbaum) Gill & Jordan.—Humpback Salmon; Haddo; Hone; Holia.**

Sacramento River northward to the Arctic Sea; abundant in Puget Sound on alternate years, 1880 being a year of scarcity. Occasionally seen in the Columbia and Sacramento, but not sufficiently abundant to constitute a distinct run. It reaches a weight of 3 to 7 pounds, being the smallest of the salmon. The females are canned in summer and fall, the hook-jawed males being rejected.

The following table gives some of the specific characters of the species of *Oncorhynchus*. The figures given are the averages of variation, so far as known:

Name.	Number of gill-rakers.	Number of anal rays (developed).	Number of pyloric ceca.	Number of scales in a longitudinal series.	Number of branchiostegals.	Average weight (pounds).	Markings.
Kisutch .....	10 13	13	70	128	13-14	6	Back spotted; tail unspotted, except upper ray.
Chonicha .....	10 14	16	160	142	15-19	20	Back and tail spotted.
Keta .....	9 14	15	160	145	13-14	12	Dorsal region with fine spots, which are often obsolete.
Nerka .....	16 23	14	80	132	13-15	6	No spots anywhere in spring; young with vague spots on back; tail speckled in fall.
Gorbuscha .....	11 17	14	225	180	12	4	Back and tail spotted.

**61. *Hypomesus pretiosus* (Girard) Gill.—Surf Smelt.**

From Monterey to Alaska; very abundant north of San Francisco, and often seen in the San Francisco markets. It deposits its spawn in the surf in the spring. It reaches a length of nearly a foot and becomes

very fat. As a pan-fish it ranks very high, being scarcely inferior to the eulachon. The *Hypomesus olidus* of Kamtschatka has been shown by Dr. Bean to be a different species, spawning in fresh waters.

62. *Thaleichthys pacificus* (Richardson) Grd.—*Eulachon*; *Hoolakin*; *Candle-fish*; *Grease-fish*; *Smelt*.

From Oregon northward, ascending the rivers in spring in enormous numbers, but not for a great distance. It is especially numerous in Frazer's River and Nass River, and very many ascend the Columbia. The run in Frazer's River takes place in May. They are exceedingly fat, and when dry are said to burn like a candle. On Nass River is a factory for the manufacture of eulachon oil, intended as a substitute for cod-liver oil. The fact that eulachon oil is semi-solid or lard-like at ordinary temperature is a serious hindrance to its salability for this purpose. When fresh, the eulachon is one of the very finest of pan-fishes, and many of them are sent to the markets of Victoria. Pickled eulachons are sent to San Francisco. It reaches a length of a little less than a foot.

63. *Osmerus thaleichthys* Ayres.—*Smelt*.

From Monterey northward; rather common, but not in such great numbers as the surf-smelt and the eulachon. It is smaller and less valuable than these. Little distinctive is known of its habits. Those brought into market are usually soft, and are less salable than the spurious "smelt," *Atherinopsis*, with which they are often mixed. It is rarely more than 6 inches in length.

64. *Osmerus attenuatus* Lockington.—*Smelt*.

Everywhere found with the preceding and scarcely less common. Nothing distinctive is known of its habits, and it may possibly turn out to be the female of the same species.

#### Family ALEPIDOSAURIDÆ.

65. *Alepidosaurus borealis* Gill.—*Hand-saw Fish*.

Puget Sound and northward, in deep water; cast on shore by storms. A head from Puget Sound in the Museum of the California Academy of Sciences, and another from the Aleutian Islands in the Museum of the Alaska Commercial Company.

#### Family PARALEPIDÆ.

66. *Sudis ringens* Jordan & Gilbert.

Known only from one specimen, about 8 inches in length, from the stomach of a *Merluccius*, itself in the stomach of an *Oreynus alalonga*, in Santa Barbara Channel.

67. *Paralepis coruscans* J. & G.

One specimen obtained at Port Townsend, Wash. It is very close to *Paralepis borealis* Reinh. from Greenland, if not identical with it.

## Family SCOPELIDÆ.

68. *Synodus lucioceps* (Ayres) Gill.—*Dingaree Dock*.

From San Francisco southward; rather common in summer and sometimes brought into the markets. It reaches a length of about a foot, and is not much valued as a food-fish. This species differs from the Atlantic *Synodus fætens* in the much greater number of scales in a vertical series, and in the longer pectorals, as well as in lesser details. The distinctive characters given by Ayres are most'y fallacious.

69. *Myctophum crenulare* Jordan & Gilbert.

One specimen, 2½ inches in length, taken from the stomach of *Oreynus alalonga*, in Santa Barbara Channel, in July. Another obtained off Vancouver's Island has been recorded by Dr. Bean.

## Family CYPRINODONTIDÆ.

70. *Cyprinodon californiensis* Girard.

Described from San Diego. Only the original types known.

71. *Fundulus parvipinnis* Girard.

From Point Concepcion southward; exceedingly abundant in muddy bays and lagoons, especially at the mouths of streams. The males in summer have the scales rough with small corneous appendages much as in some *Cyprinidæ*. This species reaches a length of 2½ inches, and is used for no purpose.

## Family SCOMBERESOCIDÆ.

72. *Exocetus californicus* Cooper.—*Flying-fish*; *Volador*.

In great schools in summer, ranging north to Point Concepcion, and very abundant about all the Santa Barbara Islands. It flies for a distance sometimes of nearly a quarter of a mile, usually not rising more than 3 or 4 feet. Its motion in the water is extremely rapid, and its motive power is certainly chiefly due to the movement of its powerful tail in the water. On rising from the water the movements of the tail are continued for some seconds until the whole body is out of the water. While the tail is in motion the pectorals are in a state of very rapid vibration and the ventrals are folded. When the action of the tail ceases, the pectorals and ventrals are spread, and, so far as we can see, held at rest. When the fish begins to fall, the tail touches the water and the motion of the pectorals recommences. When on the wing it resembles a huge dragon-fly. Its motion is very swift. At first it is in a straight line, but this becomes deflected to a curve, the pectoral on the inner side of the arc being bent downward. It is able to some extent to turn its course to shy off from a vessel. The motion seems to have no refer-



ence to the direction of the wind, and we observed it best from the bow of a steamer off Santa Catalina Island in early morning, when both air and water were free from motion.

The flying-fish reaches a length of 15 inches and a weight of about 1½ pounds. It is considered an excellent food-fish, and is taken in large numbers off Santa Catalina for the market of Los Angeles. It appears only about the middle of summer, which is its season of spawning. Nine-tenths of those seen by us in July were males.

**73. *Hemirhamphus rosæ* Jordan & Gilbert.**

Rather abundant in San Pedro and San Diego Bays, swimming slowly about near the surface. It reaches a length of probably not over a foot, and is used for no purpose.

**74. *Scomberesox brevirostris* Peters.**

One specimen taken in Monterey Bay. Recorded by Dr. Ayres from Tomales Bay.

**75. *Tylosurus exilis* (Grd.) J. & G.—*Needle-fish*; *Gar-fish*.**

From Santa Barbara southward; rather common in summer, especially in San Diego Bay. It lives in sheltered bays, swimming near the surface. It spawns in August. It reaches a length of about 2½ feet, and is esteemed a good food-fish.

### Family MUGILIDÆ.

**76. *Mugil albula* L. (*Mugil mexicanus* Steindachner).—*Mullet*; *Chub*.**

From Monterey southward; very abundant in San Diego Bay. It ascends all creeks and lagoons in winter, and many of them become land-locked and are destroyed by the pelicans. It is said to be spreading northward along the coast, and to have first appeared at San Pedro about three years ago. It reaches a length of about 15 inches, and when taken in clear water is much esteemed. Many of those brought into the market are seined in muddy lagoons, and the flavor of the water is imparted to the flesh of the mullet. Like other mullets, this species feeds on mud. It is not obviously different from the common mullet of the Atlantic coast.

### Family ATHERINIDÆ.

**77. *Leuresthes tenuis* (Ayres) Jordan & Gilbert.**

Seen at San Diego only; in some parts of the bay occurring in immense schools, but not generally common. This is one of the smaller species of the family, reaching a length of rarely more than 4 inches.

**78. *Atherinops affinis* (Ayres) Steindachner.—*Little Smelt*; *Petite Smelt*.**

Cape Mendocino southward; abundant, especially in bays and lagoons, generally preferring more sheltered places than the next species. It reaches a length of about a foot, and is a pan-fish of good quality, having firm, white flesh, which is rather dry. Many of them are dried by the Chinese.

79. *Atherinopsis californiensis* Girard.—*Common Smelt*.

From Cape Mendocino southward; very abundant, being taken with the seine in great numbers in all open bays. It is also often taken by trolling with a small hook. It reaches a length of about 18 inches, and is one of the most important food-fishes on the coast. Its flesh is firm, white, and delicate, but rather dry. The genus *Atherinopsis* is distinguished by its non-protractile premaxillaries.

## Family SPHYRÆNIDÆ.

80. *Sphyræna argentea* Girard.—*Barracuda*; *Barracuta*.

Abundant in summer from San Francisco southward, especially about Monterey (Soquel) and the Santa Barbara Islands. The chief run is in July. It spawns in August, and then disappears, probably retiring into deeper water, or perhaps moving southward. It is taken chiefly by trolling at a distance of 3 or more miles from the mainland. About the islands it may be sometimes taken by still-fishing. The young are often taken in seines in winter. It reaches a length of about 3 feet and a weight of about 12 pounds. It is considered one of the best food-fish, and when salted and dried sells at a higher price than any other, even than the Alaska cod-fish.

## Family AMMODYTIDÆ.

81. *Ammodytes personatus* Girard.—*Sand Lant*; *Sand Lance*.

Abundant along sandy shores from Monterey to Alaska. Found in immense schools in Puget Sound. It burrows in the sand between tide-marks. It reaches a length of 5 or 6 inches, and is sometimes taken for bait.

## Family ECHENEIDÆ.

82. *Remora jacobœa* (Lowe) Gill.

A single specimen seen in the market at San Francisco. It is probably not uncommon.

83. *Echeneis naucrates* L.

Occasionally taken about San Francisco.

## Family XIPHIIDÆ.

84. *Xiphias gladius* Linné.—*Sword-fish*; *Espada*.

Occasionally seen about Santa Catalina and the Coronados, but never taken, the fishermen having no suitable tackle. One seen by us off Santa Monica about 8 feet in length.

## Family SCOMBRIDÆ.

85. *Scomber scombrus* Linné.—*Eastern Mackerel*.

Not seen by us. Capt. Charles Willughby, Indian agent at Neah Bay, formerly a mackerel-fisher in Massachusetts, informs us that he

once netted a school of true eastern mackerel off Santa Catalina Island. J. Weinmiller, of Santa Barbara, has also taken them occasionally off Anacapa Island. There is little doubt of the casual occurrence of this species on our Pacific coast.

**87. *Scomber pneumatophorus*** Delaroche.—*Easter Mackerel*; *Tinker Mackerel*; *Little Mackerel*.

(*Scomber diego* Ayres; *Scomber deKayi* Storer.)

From Monterey southward; coming in irregular and often large schools in summer and fall. It reaches a length of a little more than a foot.

**88. *Orcynus alalonga*** (Gmelin) Risso.—*Albicore*.

(*Orcynus pacificus* Cooper; *Thynnus pacificus* C. & V.)

From San Francisco southward; abundant in summer south of Point Concepcion and taken by trolling. It is found in deeper water than the bonito, being rarely taken within 6 miles of the shore. It feeds on anchovy and squid, and occasionally rare deep-water fishes are found in its stomach. It is shorter and deeper than the bonito, weighing 12 to 15 pounds. It is little valued as a food-fish, selling at about 25 cents. It is caught chiefly for sport, as it is a very gamy fish.

Another *Orcynus*, known as the "tuna", exists about Santa Cruz Island, but we failed to obtain it.

**89. *Sarda chilensis*** (Cuvier & Valenciennes) J. & G.—*Bonito*; *Spanish Mackerel*; *Skipjack*; *Tuna*.

From Monterey southward; very abundant everywhere in summer, when it is taken in great numbers, by trolling, at a distance of 2 or 3 miles from shore. It is extensively salted and dried, but the flesh is rather coarse, and it brings a lower price than the yellow-tail and barracuda. It reaches a weight of about 12 pounds and sells at about 25 cents. After the spawning season the young are very abundant in the kelp.

**90. *Scomberomorus concolor*** (Lockington) Jordan & Gilbert.

Monterey Bay. It comes to the market at San Francisco from Soquel every year, but in small numbers. Rarely more than 18 or 20 come in in a single season. This year (1880) upwards of 40 were taken, nearly half of which were secured by us. Its usual price in the market of San Francisco is about \$2.50. The female is marked by two rows of alternating, round, bronze spots about the size of the pupil.

### Family CORYPHÆNIDÆ.

**91. *Coryphæna*** (species).

A dolphin came ashore in a storm at Cayucos a few years since. Its captor and eater informs us that he is well acquainted with the dolphin in Mexican waters, and that this was the same fish.

## Family STROMATEIDÆ.

92. *Stromateus simillimus* Ayres.—*Pompano*.

Entire coast; common, but most abundant from Santa Barbara to San Francisco. Its movements on the coast are very irregular. It is usually scarce in winter everywhere, and it is said that it was formerly much less abundant than now. It is taken in seines, and also by hook and line or grab-hook from the wharves. It is usually esteemed as the best pan-fish on the coast, and always brings a high price—25 to 50 cents per pound. It reaches a length of 8 inches and a weight of little more than half a pound.

## Family CARANGIDÆ.

93. *Seriola lalandi* Cuvier & Valenciennes.—*Yellow Tail*; *White Salmon*; *Cavasina*.  
(*Seriola mazatlanu* Steindachner.)

Only about the Santa Barbara and Coronados Islands, where it is abundant in summer, spawning in July and August; not seen in winter. It is taken by trolling only. As a fresh fish it ranks high. When salted it is graded as best, with *Dekaya* and *Sphyrana*. It feeds on squid and various small fishes, and reaches a weight of 40 to 50 pounds and a length of 4 to 5 feet. The "horse-mackerel, *Halatractus dorsalis*", referred to by Dr. Cooper in Cronise's Natural Wealth of California, is undoubtedly the present species.

94. *Caranx caballus* Günther.

(*Trachurus boops* Grd.)

Only the original type of Girard's description has been taken on our coast.

95. *Trachurus plumierianus* (Lacépède) J. & G.—*Horse Mackerel*.

(*Trachurus trachurus* Günther; *Trachurus symmetricus* Ayres.)

Very abundant in summer as far north as Monterey. It is taken in seines in large numbers and used chiefly for bait. Many of them are salted for this purpose. It reaches a length of about a foot and a weight of less than a pound.

Specimens of this species from Monterey and from Venice are not obviously different. The individual variations in the curvature of the lateral line are considerable.

## Family SERRANIDÆ.

96. *Serranus maculofasciatus* Steindachner.—*Cabrilla*; *Rock Cod*; *Rock Bass*.

San Pedro to San Diego and southward; abundant in the bays, especially at San Diego, where many are taken in seines, and with hook and line from the wharves. Not seen northward and not found in deep water or about the islands. It feeds chiefly on crustaceans and squid. It reaches a length of about 15 inches and a weight of 2 or 3 pounds, and is considered an excellent food-fish.

97. *Serranus nebulifer* (Grd.) Steind.—*Johnny Verde*; *Cabrilla*; *Rock Bass*.

From Monterey Bay southward; common about San Pedro and in San Diego Bay with the preceding. It reaches a length of 18 inches and a weight of 3 to 4 pounds, and is considered a good food-fish.

98. *Serranus clathratus* (Grd.) Steind.—*Cabrilla*; *Rock Bass*; *Kelp Salmon*.

From San Francisco southward; very abundant south of Point Concepcion. One of the most common food-fishes about the islands. It feeds on crustacea and squid, and is found in not very deep water, chiefly about rocks. It reaches a length of 18 inches and a weight of about 5 pounds. It is considered one of the better class of food-fishes. It is not often split and salted.

99. *Stereolepis gigas* Ayres.—*Jew-fish*; *Black Sea Bass*.

From the Farallones southward, chiefly about the islands; not rare, but from its great size not very often taken. Taken by still-fishing, not by trolling. It attains a weight of 400 to 500 pounds. Often taken by swallowing white fish, etc., when the latter are on the hook.

#### Family PRISTIPOMATIDÆ.

100. *Xenichthys californiensis* Steind.

Described from San Diego. No specimens obtained by us.

101. *Pristipoma davidsoni* Steindachner.—*Sargo*.

San Pedro to San Diego; not common. Four seen by us at San Pedro. Probably only taken in summer, and then in small numbers. Feeds on crustacea. Reaches a length of somewhat more than a foot.

#### Family SPARIDÆ.

102. *Scorpiis californiensis* Steindachner.—*Media-luna*; *Half-moon*.

Santa Barbara Islands and southward. Especially abundant about Catalina, where it is one of the principal food fishes, being taken in great numbers in gill-nets. Rare at Santa Cruz Island, and probably not found northward. One in the Museum of the California Academy said to come from Tomales Bay. Feeds chiefly on crustacea. It reaches a length of about a foot and a weight of 3 pounds. It is not often dried, but ranks high as a pan-fish.

103. *Girella nigricans* (Ayres) Gill.—*Blue-fish*.

From Monterey southward; abundant about the Santa Barbara Islands, where it is an important food-fish. Taken chiefly in gill-nets. It is entirely herbivorous. It is very tenacious of life, but begins to soften soon after death. It reaches a length of about a foot and a weight of 4 pounds. It is considered a fair pan-fish.



## Family EPHIPPIDÆ.

104. *Chætodipterus faber* (Bloch) Bleeker.

Described from San Diego as *Ephippus zonatus* Grd. Not obtained by us.

## Family SCLENIIDÆ.

105. *Seriphus politus* Ayres.—*Queen-fish*; *King-fish*.

From San Francisco southward; abundant in summer. Found along sandy shores and taken with seines, sometimes in great numbers, notably at Santa Barbara and Soquel. It is considered the best of the small Scienoids, but is too small to be of very great importance. It reaches a length of 8 inches, but is usually still smaller.

106. *Cynoscion parvipinne* Ayres.—*Blue-fish*; *Corrina*; *Cararina*; *Sea Bass*.  
(*Otolithus magdalene* Steind.)

From San Pedro southward; very abundant at San Diego. It frequents the bays, and is taken in seines and gill-nets. It feeds chiefly on crustacea. Its flesh is extremely good when fresh, but it soon softens, being similar to that of the weak-fish (*C. regale*) in that respect. It reaches a length of about 2 feet and a weight of 8 pounds.

107. *Atractoscion nobile* (Ayres) Gill.—*White Sea Bass*; *Sea Bass*; *Sea Trout* (yg.); *Corrina*.  
(*Otolithus californiensis* Steind.)

From San Francisco southward; very abundant in spring and summer; not often seen in winter; only adults usually taken in spring. Caught by trolling and in gill-nets, the young in summer by seines. It reaches a length of 4 feet and a weight of 50 pounds or more. Its flesh is highly esteemed, and is much firmer than that of the eastern weak-fish. The food consists of crustacea, anchovies, etc.

The young ("sea trout") is often considered by fishermen as a distinct species.

108. *Menticirrus undulatus* (Grd.) Gill.—*Bagre*; *Sucker*; *Sucker Bass*.

From Santa Barbara southward; abundant; taken in seines and gill-nets along sandy shores. It reaches a length of 18 inches and a weight of 2½ pounds. It is held in moderate esteem as a food-fish. It feeds largely on crustacea. Girard's type of *Umbrina undulata* is a very young specimen of this species.

109. *Umbrina xanti* Gill.—*Yellow-finned Roncador*; *Yellow-tail Roncador*.

From Santa Barbara southward; generally abundant. Found along sandy shores, and taken in seines and gill-nets. It feeds on crustacea, squids, etc., and spawns in July. It reaches a length of about a foot and a weight of nearly 2 pounds. It is considered a food-fish of good quality, and many are split and salted at San Pedro.

110. *Roncador stearnsi* (Steind.) J. & G.—*Roncador*; *Croaker*.

From Santa Barbara southward; generally abundant on sandy shores, in rather deeper water than the *Umbrina*. Taken chiefly in the gill-nets. It feeds mostly on crustacea, and spawns in July. It reaches a length of about 2 feet and a weight of 5 or 6 pounds. It is considered a good food-fish.

111. *Corvina saturna* (Grd.) Gthr.—*Red Roncador*; *Black Roncador*.

From Santa Barbara southward; in similar situations with the preceding, but less abundant. It reaches a length of 16 to 18 inches and a weight of 3 pounds. Like the *Menticirrhus* it is less attractive in color than *Umbrina* and *Roncador*, but is probably similar in flesh.

112. *Genyonemus lineatus* (Ayres) Gill.—*Little Bass*; *Little Roncador*.

From San Francisco southward; not common in winter, but excessively abundant in summer, especially from Santa Barbara northward. It lives between the shore and the kelp, and is taken with hook and line at the border of the kelp, and also in great numbers in seines. Its food is chiefly crustacea. It reaches a length of less than a foot and a weight of nearly a pound. It is rather soft, and not much valued as food, although excellent when fresh. Many are dried by the Chinese.

## Family EMBIOTOCLIDÆ.

(*Perch*; *Surf-fish*.)

The fishes of this family are exceedingly abundant along our entire Pacific coast, the centre of distribution being from Santa Barbara to San Francisco. They all go by the general name of perch, and the fishermen rarely make any distinction of the species. All are ovoviviparous, bringing forth their young, 15 to 20 at a time, in spring or early summer. The young are then  $1\frac{1}{2}$  to  $2\frac{1}{2}$  inches in length, and perfectly able to take care of themselves. At birth they closely resemble the adult fish, but are redder, more compressed, and with higher fins. The flesh of the Embiotocoids is very similar in all the species, being flavorless and poor.

113. *Rhacochilus toxotes* Agassiz.—*Alfione*; *Sprat*; *Perch*.

San Pedro to San Francisco; rather common, especially about Soquel. Like the other species of the family, it feeds on crustacea and small fish. This species is the largest of the family, reaching a weight of 4 pounds, and is considered the best of this very inferior group.

114. *Damalichthys argyrosomus* (Girard) J. & G.—*White Perch*.

From San Pedro to Puget Sound; generally common and exceedingly abundant in Puget Sound; next to *Ditrema laterale* and *Micrometrus aggregatus*, the species most numerous in individuals on the coast. It is considered as, next to the preceding, the best of the *Embiotocidæ*, and reaches a weight of 2 pounds.

The genus *Damalichthys* is distinguished from *Ditrema* by the extraordinary development of the pharyngeal bones.

**115. *Ditrema furcatum* (Grl.) Gthr.**

San Diego to San Francisco; exceedingly abundant everywhere. Not noticed northward. It lives in sheltered bays and is taken with seines. It rarely reaches a pound weight, and is little esteemed.

**116. *Ditrema atripes* J & G.**

Monterey Bay; abundant at Monterey, where large numbers are taken in seines. It reaches the weight of  $1\frac{1}{4}$  pounds.

**117. *Ditrema laterale* (Agassiz) Gthr.—Perch; Surf-fish; Blue Perch**

Santa Barbara to Puget Sound; very abundant. Northward the most common of the larger species. It reaches a weight of 2 pounds, and is an important market fish, although poor and watery.

**118. *Ditrema jacksoni* (Agassiz) Gthr.—Perch; Croaker; Surf-fish.**

San Diego to Puget Sound; scarce north of San Francisco, but extremely abundant south of Point Concepcion, and brought in large numbers to the markets. It reaches a weight of  $1\frac{1}{2}$  pounds, and is about as poor as the rest of the tribe.

**119. *Hypsurus caryi* (L. Agassiz) A. Agassiz.—Bagara.**

Tomales to Santa Barbara; generally very abundant in the edge of the kelp, especially at Monterey. It is often taken with hook and line or baited dip-nets, and sometimes in great numbers in seines. It is used chiefly for bait for rock cod, the larger ones being sent to the markets. It rarely weighs more than half a pound. In color it is one of the most brilliant and attractive.

**120. *Amphistichus argenteus* Agassiz.—Surf-fish; White Perch.**

Tomales to San Diego; locally very common on sandy shores, especially in the surf; more abundant at Soquel and Santa Barbara than elsewhere. It reaches a weight of  $1\frac{1}{2}$  pounds.

**121. *Holconotus rhodoterus* Ag.**

Tomales to Santa Barbara; not so common as most of the other species, but often locally abundant; most numerous at Soquel. It reaches a weight of nearly  $1\frac{1}{2}$  pounds.

**122. *Holconotus agassizi* (Gill) J. & G.**

Tomales to Santa Barbara; in abundance and distribution similar to the preceding species. It rarely weighs over  $\frac{1}{2}$  pound.

**123. *Holconotus argenteus* (Gibbons) J. & G.—Wall-eye; White Perch.**

San Diego to Tomales; everywhere abundant. Taken with seines in great numbers in sandy shores, and often with hook and line from the wharves. It weighs about  $\frac{1}{2}$  pound, and is little esteemed.

124. *Holconotus analis* (A. Agassiz) J. & G.

San Francisco to San Luis Obispo; only locally abundant. Common only at Soquel and Santa Cruz, where it is largely taken, with *Micrometrus*, as bait for rock-fish, etc. It weighs less than  $\frac{1}{4}$  pound, and seldom comes into the markets.

125. *Brachyistius rosaceus* J. & G.

About San Francisco; occasionally brought in with sweep-nets; not seen elsewhere. Its weight is usually less than  $\frac{1}{2}$  pound. It is the most brightly colored of the *Embiotocidae*.

126. *Brachyistius frenatus* Gill.

From Catalina Island to Puget Sound; widely distributed and often locally very abundant, as at Monterey, Point Reyes, etc. It is used chiefly for bait, never coming into the markets except by accident when mixed with other fish. Weight  $\frac{1}{4}$  pound.

127. *Micrometrus aggregatus* Gibbons.—*Shiner*; *Sparada*; *Minnie*; *Little Perch*.

Entire coast from San Diego to Puget Sound; everywhere the most abundant species of the group. Found especially in sheltered bays. It weighs less than  $\frac{1}{4}$  pound, and is used only for bait.

128. *Abeona aurora* J. & G.

Known only from Monterey Bay, where it is very abundant about rocks. Many of them inhabit the larger rock-pools at Point Pinos. It reaches a weight of about  $\frac{1}{3}$  pound, and is occasionally sent to the San Francisco market.

129. *Abeona minima* (Gibbons) Gill.—*Shiner*.

Tomales to San Diego; rather common, but less abundant than most of the other species. It is the smallest of the tribe, rarely weighing  $\frac{1}{4}$  pound. The genus *Abeona* is distinguished from *Gymnogaster* by its trilobate incisor-like teeth.

130. *Hysterocarpus traski* Gibbons.—*Fresh-water Perch*.

Sacramento and San Joaquin Rivers, and streams southward as far as San Luis Obispo; probably abundant. Many are brought into the market of San Francisco, where they are eaten chiefly by the Chinese. It reaches a weight of less than  $\frac{1}{2}$  pound.

Family LABRIDÆ.

131. *Pimelometopon pulcher* (Ayres) Gill.—*Red-fish*; *Fat head*.

Point Concepcion southward: very abundant in the kelp, and taken in immense numbers by the Chinamen, who salt and dry them. It feeds on crustacea and shells. The flesh is rather coarse, but the fat forehead is esteemed for chowder. It reaches a weight of 12 to 15 pounds. Rare instances of its occurrence at Monterey are on record.

132. *PlatyGLOSSUS semicinctus* (Ayres) Günther.—*Kelp-fish*.

Santa Catalina and southward; not rare in the kelp; occasionally taken in the gill-nets at San Pedro, and sometimes with a hook. It reaches a weight of about a pound.

133. *OxyJULIS modestus* (Grd.) Gill.—*Scñorita*; *Pesca Rey*.

From Monterey southward; common in the kelp, and often taken with hook or line or baited dip-net. It reaches a weight of little more than  $\frac{1}{4}$  pound, and is used chiefly for bait, although said to have flesh of fine quality.

## Family POMACENTRIDÆ.

134. *Chromis punctipinnis* Cooper.—*Blacksmith*.

Santa Barbara Islands and southward; abundant; taken with gill-nets or hook and line. It feeds, like the other species, on shells and crabs. It is not much valued as food, and reaches a weight of about 2 pounds.

The record by Yarrow and Henshaw of *Chromis atrilobata* Gill from Santa Barbara refers to this fish. (Wheeler's Surv., Appendix NN, Ann. Rept. Chief Engin., 1878, 203.)

135. *Hypsypops rubicundus* (Grd.) Gill.—*Garibaldi*; *Red Perch*; *Gold-fish*.

Abundant about the Santa Barbara Islands and southward; taken chiefly with gill-nets. It reaches a weight of 3 to 4 pounds, and is not held in very high esteem as a food-fish, although gorgeously colored.

## Family TRACHYPTERIDÆ.

136. *Trachypterus ?altivelis* Kner.—*King of the Salmon*.

Comes ashore occasionally when pursued by other fishes or after storms. The Makah Indians consider them the kings of the salmon, and will not let any one eat them.

Three specimens are certainly known—one from Santa Cruz (Dr. C. L. Anderson), and two from Neah Bay (Judge J. G. Swan). The specimen from Santa Cruz, about a foot long, examined by us, is evidently close to *T. altivelis*, the differences noticed being perhaps due to age.

## Family ICOSTEIDÆ.

137. *icosteus ænigmaticus* Lockington.

San Francisco and northward, in deep water; two found in San Francisco market; one in University of California from the coast of Northern California. It reaches a length of about 10 inches.

138. *icichthys lockingtoni* J. & G.

San Francisco and northward, in deep water. The only specimen known, found in the market at San Francisco, is about 8 inches long.

139. *Bathymaster signatus* Cope.—*Ronchil*.

Puget Sound and northward, in deep water; taken with hook and



line about Seattle, in some abundance on a reef of ballast rocks, in deep water, tolerably abundant. It reaches a length of 6 to 8 inches, and is used chiefly for bait.

Family LATILIDÆ.

140. *Dekaya princeps* (Jenyns) J. & G.—*White-fish; Yellow-tail*.

From Monterey southward; abundant about all the islands, but only occasional at Monterey. It feeds largely on crustacea. It is taken chiefly with hook and line from reefs. Many of them are salted and dried both by Americans and Chinese. As a salted fish it ranks high; as a fresh fish of fair grade. It reaches a length of over 2 feet and a weight of 10 to 14 pounds.

Family TRACHINIDÆ

141. *Trichodon stelleri* C. & V.

Alaska; occasionally southward to San Francisco; not seen by us from this coast. A specimen in Alaska Commercial Company's collection from Aleutian Islands.

Family GOBIIDÆ.

142. *Gillichthys mirabilis* Cooper.—*Mud-fish*.

From San Francisco southward, abounding in the muddy bottom of creeks and slimy lagoons into which the tide flows; very abundant about Oakland and at San Pedro and San Diego. It burrows into the mud, the bottoms being honeycombed with its holes. Two small specimens of a species of this genus were taken in the stomach of a *Hexagrammus stelleri*, in Saanich Arm, Vancouver's Island. It reaches a length of 5 or 6 inches. It may readily be taken with a small hook. Mr. Charles R. Orcutt obtained them for us in a creek near San Diego at the rate of 50 per hour.

143. *Eucyclogobius newberryi* (Grd.) Gill.

Not obtained by us. Described from Tomales Bay.

144. *Lepidogobius gracilis* (Grd.) Gill.

From San Francisco northward; occasionally taken in the sweep-nets with the tom-cod, and thus brought into the markets; seen by us at San Francisco and Victoria. It reaches a length of 4 inches. Nothing special is known of its habits.

145. *Gobius glaucofrenum* (Gill) J. & G.

Not seen by us. Described from Puget Sound.

146. *Othonops eos* Rosa Smith.

The specimens known found burrowing in sand among rocks about Point Loma, near San Diego. Locally very abundant.

## Family CHIRIDÆ.

147. *Anoplopoma fimbria* (Pallas) Gill.—*Horse Mackerel*; *Candle-fish*; *Beshowe*.

From Monterey northward; generally common, especially in Puget Sound, where many are taken from the wharves, especially at Seattle. Taken by the Chinese at Monterey with set-lines, in rather deep water, and about San Francisco in winter with sweep-nets. It feeds on crustacea, worms, and small fish, and reaches a length of 40 inches and a weight of 15 pounds; those usually seen rarely exceed 2 or 3 pounds. As a food-fish it is generally held in low esteem, although sometimes fraudulently sold as "Spanish mackerel". The large specimens taken in deep water about Vancouver's Island, known to the Makah Indians as Beshowe, are highly valued as food-fish, according to Mr. Swan.

148. *Myriolepis zonifer* Lockington.

The only specimen known came from Monterey Bay. It is about 10 inches in length.

149. *Oxylebius pictus* Gill.

From Monterey northward, living among rocks near shore, in clear waters; not very rare, but from its small mouth and peculiar habits very rarely taken except for bait in dip-nets baited with crushed crabs. Seen by us at San Francisco, Monterey, and Saanich. It reaches a length of 6 to 8 inches, and is used only for bait.

150. *Zaniolepis latipinnis* Grd.

From San Francisco northward, in rather deep water. It is taken in large numbers in the sweep-nets of the paranzelle, and is occasionally brought into the markets of San Francisco. It feeds on crustacea, reaches a length of about a foot, and is not often eaten.

151. *Ophiodon elongatus* Grd.—*Cultus Cod*; *California Cod*; *Blue Cod*; *Buffalo Cod*; *Ling*.

From Santa Cruz Island northward; excessively abundant from Monterey to Victoria and beyond. It lives about rocky places, and is taken with hook and line or gill-net. Many are dried by the Chinese and Indians. It feeds on crustacea, squid, and various fishes. It reaches a larger size northward than about San Francisco, the greatest length being nearly 5 feet and the weight 50 or 60 pounds; most seen in market are considerably smaller. It is one of the better food-fishes, and in amount is one of the most important on the coast. Its flesh is usually of a pale livid blue.

152. *Hexagrammus decagrammus* (Pallas) J. & G.—*Boregat*; *Sea Trout*; *Bodieron*; *Rock Trout*.

From San Luis Obispo northward; everywhere moderately common, most so in the Bay of Monterey and off San Francisco. A common fish

of the San Francisco markets. It feeds chiefly on crustacea and worms. It dies soon after being taken from the water, and does not keep very long before softening. The fish spawns in July. The males (*Chiropsis constellatus* Grd.) and the females (*C. guttatus* Grd.) differ so much in color that they have been usually taken for distinct species. The form lately described by Mr. Lockington as *Chirus maculoseriatus* is, so far as we have noticed, always female, and it seems to vary by insensible degrees into the ordinary *guttatus*. It reaches a length of 15 inches and a weight of 2-3 pounds. It is a food-fish of fair quality, but inferior to the *Ophidon* and *Sebastichthys*.

**153. Hexagrammus superciliosus** (Pallas) J. & G.—*Sea Trout*.

From Monterey northward; not very common south of Puget Sound, and not very abundant there. In food, size, and qualities identical with the preceding. The color is quite variable and the flesh is often blue.

**154. Hexagrammus asper** Steller.—*Starling*.

(*Chirus hexagrammus* Gthr.; *Chirus trigrammus* Cope.)

From Puget Sound northward; abundant everywhere in Puget Sound. Taken in rocky places with seines and gill-nets. Intestines usually with long tænioid worms. Size and value same as that of other species. The type of *Chirus nebulosus* Girard belongs to this species. The tips of the first three soft rays have been broken off, and they were taken by Girard for spines.

### Family SCORPÆNIDÆ.

**155. Sebastodes paucispinis** (Ayres) Gill.—*Baccaccio*; *Merou*; *Jack*; *Tom Cod*.

Coast from San Francisco to the Santa Barbara Islands, inhabiting chiefly reefs in deep water, the young coming near shore. Taken mostly with hook and line. It feeds on various small fish. It reaches a weight of 12 to 14 pounds, and is one of the best food-fishes. Many are taken in the winter at Monterey, and in the summer the young from the wharves.

### Genus SEBASTICHTHYS Gill.

The members of this extensive genus are extremely abundant on our Pacific coast, and form one of the most striking features of its fauna. All are food-fish of good quality, and are sold in the markets under the general name of rock-fish or rock-cod. All the species are ovoviviparous. The young are produced in enormous numbers, and are brought forth in early summer or spring. They are then very slender, with large eyes and imperfectly developed fins, and are from  $\frac{1}{3}$  to  $\frac{1}{4}$  inch in total length.

**156. Sebastichthys flavidus** (Ayres) Lockington.—*Yellow-tail*.

From San Diego to Cape Mendocino; very abundant in Monterey Bay and about San Francisco. It is found in both deep and shallow

water, and is taken in large numbers with gill-nets and set-lines. Like all the species of the genus, it feeds on crustacea and small fish. This species is one of the larger ones of the genus, reaching a weight of 6 or 7 pounds. It is considered as one of the best of the group.

157. *Sebastichthys melanoops* (Gr.) Gill.—*Black Bass*.

From Monterey northward; most common in Puget Sound; not very abundant about San Francisco, but frequently seen in the markets. In size, habits, and value not essentially different from *S. flavidus*, with which species its affinities are closer than with *S. mystinus*.

158. *Sebastichthys mystinus* J. & G.—*Black Rock-fish*; *Pêche Prêtre*; *Black Bass*.

From San Diego northward; more common about Monterey and San Francisco than either northward or southward. It is found in rather shallow waters, and is mostly taken in gill-nets. It reaches a weight of 5 pounds, and from its color is less salable than the others of the group, although the flesh is probably similar. It is probably sent to San Francisco in greater numbers than any other species.

159. *Sebastichthys entomelas* J. & G.

Known only from Monterey, where it is taken with hook and line in deep water. Thus far the least abundant of the species. Similar in size and value to *flavidus*.

160. *Sebastichthys ovalis* (Ayres) Lockington.—*Flura*.

From Santa Barbara to Monterey; taken with hook and line in very deep water; one of the least abundant species. Similar in size and value to *S. flavidus*.

161. *Sebastichthys proriger* J. & G.

About Monterey and the Farallones; taken with the next species in very deep water; not rare in its haunts. One of the smallest species, not weighing more than 1½ pounds. In quality similar to other small red species.

162. *Sebastichthys elongatus* (Ayres) Gill.—*Reina*.

About Monterey and San Francisco; abundant in very deep water with the preceding. It is a small species, reaching a weight of 2 pounds, and being handsomely colored is one of the most salable species. It is not very common in the markets except in spring.

163. *Sebastichthys atrovirens* J. & G.—*Garrupa*; *Green Rock-fish*.

From San Francisco to San Diego; abundant about rocky places in rather shallow water. Taken in considerable numbers in gill-nets, especially south of Point Concepcion. Many of them are taken in the winter about the Santa Barbara Islands, and a good many are dried and salted by the Chinamen. It reaches a weight of 3 pounds, and is graded with *flavidus* and *nebulosus*.

164. *Sebastichthys pinniger* (Gill) Lockington.—*Flamme*; *Red Rock Cod*.

From Monterey northward; abundant everywhere in deep water and taken in great numbers, chiefly with set-lines, not often with gill-nets. This is probably the most abundant red species in the San Francisco markets, and many are split and salted in the deep waters of Puget Sound. It is a large species, reaching a weight of 8 or 10 pounds. It sells as well as the other red or green species, unless too large, when the flesh is rather coarse.

165. *Sebastichthys miniatus* J. & G.—*Rasher*; *Rasciera*.

From Santa Barbara to San Francisco; found with the preceding, but often in water less deep. It is taken with hook and line and gill-nets, and is sent into the market of San Francisco in large numbers. It reaches the same size as the preceding, and is equally valuable.

166. *Sebastichthys ruber* (Ayres) Gill.—*Red Rock Cod*; *Rock-fish*; *Tambor*.

From Santa Barbara northward; most abundant in Puget Sound and about San Francisco; taken with hook and line in deep water. Large specimens seen about Victoria with the skull above infested by an encysted parasitic worm. One of the most abundant species in the San Francisco markets, and probably reaches the largest size of any—10 to 12 pounds. The large ones are very robust in form. It grades with *pinniger* and *miniatus*, from which it is not distinguished by the trade.

167. *Sebastichthys rubrivinctus* J. & G.—*Spanish Flag*.

From Santa Barbara to Monterey, about the reefs in very deep water; occasionally taken with hook and line in spring. It reaches a weight of 6 pounds. In beauty of coloration it surpasses all other fish on the coast.

168. *Sebastichthys constellatus* J. & G.—*Bugre*.

From Santa Barbara to San Francisco, in deep water; taken with hooks only; rather abundant and frequently seen in the market. It reaches a weight of 2 or 3 pounds, and ranks with *rosaceus* and other small species, and, like them, spawns at Monterey in early spring.

169. *Sebastichthys rosaceus* (Grd.) Gill.—*Corsair*.

From San Francisco to Santa Barbara (*San Diego*, Grd.), on reefs in deep water; where found the most abundant of the red species. It is one of the smallest species, rarely weighing over 1½ pounds, and is taken to the San Francisco market in great numbers.

170. *Sebastichthys rhodochloris* J. & G.—*Fly-fish*.

Monterey and the Farallones, where it occurs in deep water with the preceding in considerable abundance, and with it is occasionally sent in large numbers to the San Francisco market in the spring.

171. *Sebastichthys chlorostictus* J. & G.—*Pesce Verniglia*.

Known from Monterey and the Farallones, where it occurs in considerable abundance with the three preceding species. It is a larger fish, reaching a weight of 4 pounds.



172. *Sebastichthys caurinus* (Rich.) J. & G.

Puget Sound northward; in habits and value similar to its Southern representative *S. vexillaris*.

173. *Sebastichthys vexillaris* J. & G.—*Red Garrupa*.

San Diego to Puget Sound; generally abundant along the coast in water of moderate depth. Taken chiefly with nets. Many are sent to the San Francisco market, it ranking with abundance only behind *ruber*, *pinniger*, *rosaceus*, *flavidus*, *mystinus*, *auriculatus*, and *carnatus*. It is one of the larger species, reaching a weight of 5 or 6 pounds.

174. *Sebastichthys auriculatus* (Grd.) Gill.—*Rock-fish*.

Santa Barbara to Puget Sound; everywhere one of the most abundant species, and always the one most frequently taken near shore. It is the only one frequenting, habitually, shallow bays and taking the hook around wharves. It is common in the San Francisco markets and reaches a weight of 3 pounds, although usually taken in San Francisco Bay at half a pound weight. It is less valued than the deep-water species as food.

175. *Sebastichthys rastrelliger* J. & G.—*Garrupa*; *Grass Rock-fish*.

From Humboldt Bay southward; abundant about the Santa Barbara Islands, where it is taken with hooks and gill-nets, but rarely with seines. It occurs in considerable numbers in the San Francisco markets. It reaches a weight of  $2\frac{1}{2}$  pounds, and is esteemed as the best of the family as food.

176. *Sebastichthys maliger* J & G.

From Monterey northward, in rather deep water; commonest in the Straits of Fuca, where it is taken with hook and line. It is occasionally seen in the San Francisco markets, but is one of the less common species. It is one of the largest species, reaching a weight of 6 pounds.

177. *Sebastichthys carnatus* J. & G.—*Garrupa*.

From Santa Barbara to San Francisco; abundant at Monterey, where it is taken in great numbers in rather shallow water with gill-nets. At Santa Barbara it is rare, and it has not been noticed northward. It reaches a weight of  $2\frac{1}{2}$  pounds, and grades with *atrovirens*, *flavidus*, *nebulosus*, etc., as fairly good.

178. *Sebastichthys chrysomelas* J. & G.—*Garrupa*.

From Santa Barbara to San Francisco; rather less abundant than the preceding and found in rather deeper water. Otherwise very similar in size and habits.

179. *Sebastichthys nebulosus* (Ayres) Gill.—*Garrupa*; *Rock Cod*.

From Monterey to Puget Sound; rather common, and becoming abundant northward. It occurs in water of moderate depth and is taken by means of hooks and gill-nets. It is rather common in the markets of San Francisco, and reaches a weight of  $3\frac{1}{2}$  pounds.

180. *Sebastichthys serriceps* J. & G.—*Tree-fish*.

From San Diego to San Francisco: abundant about Catalina Island in rather deep water among rocks; less common northward, but occasionally seen in the San Francisco markets. It reaches a weight of about 3 pounds.

181. *Sebastichthys nigrocinctus* (Ayres) Gill.

Monterey to Puget Sound; rather abundant in the Straits of Fuca in very deep water: rare about San Francisco, and only occasionally taken with a hook and line in deep water. It is one of the most striking species in color, and hence preferred by buyers. It reaches a weight of 4 pounds.

182. *Scorpæna guttata* Grd.—*Scorpene*; *Sculpin*; *Scorpion*.

Santa Barbara southward; very abundant in rocky places, and often in bays and shallow water. It feeds on crustacea and spawns in spring. It is esteemed as one of the best of food-fishes. It reaches a weight of rarely more than  $1\frac{1}{2}$  to 2 pounds. A wound from its dorsal spines is extremely painful for a time, like a poisoned sting.

Family COTTIDÆ.

183. *Nautichthys oculofasciatus* Grd.

From San Francisco northward, rare; occasionally taken in Puget Sound in rather deep water. It reaches a length of 6 to 8 inches.

184. *Blepsias cirrhosus* (Pallas) Gthr.

From San Francisco northward, scarce; not rare in Puget Sound, where it is sometimes taken in seines. It reaches a length of about 6 inches. Like the preceding, it is occasionally preserved as a curiosity.

185. *Oligocottus analis* Grd.—*Little Scorpion*.

From Monterey to Lower California; common in rock-pools, and extremely active. It reaches a length of about 4 or 5 inches.

186. *Oligocottus maculosus* Grd.—*Johnny*.

From San Luis Obispo to Alaska; exceedingly abundant northward, in rock-pools and among stones close to shore in sheltered bays. One of the most abundant species on the coast so far as the number of individuals is concerned. It reaches a length of  $2\frac{1}{2}$  inches, being the smallest of our marine *Cottide*. It is subject to great variations in color, dependent on the character of its surroundings.

187. *Blennicottus globiceps* (Grd.) Gill.

From Monterey to Puget Sound and northward, in rock-pools, with the preceding. Its motions are, however, much less active. It is nowhere abundant. It reaches a length of 5 inches.

188. *Liocottus hirundo* Girard.

About Santa Barbara and the islands; taken with hook and line; rare. It reaches a length of about 7 inches.

189. *Leptocottus armatus* Grd.—*Sculpin*; *Drummer*.

Entire coast; everywhere abundant in lagoons, sheltered bays, and muddy bottoms. It feeds on crustaceans, and takes the hook readily. It reaches a length of a foot, and is held in no esteem. Some are dried by the Chinese, who consider it one of the least valuable fishes. Its movements are in general more active than those of most sculpins.

190. *Scorpenichthys marmoratus* Grd.—*Sculpin*; *Capisone*; *Salpa*; *Biggyhead*.

Entire coast; very abundant about San Francisco, becoming less common north and south, but seen by us at Victoria and San Diego. It lives in the kelp, at moderate depths, and is taken with the hook or gill-net. It is a coarse, dry fish, held in very low esteem, and not sent to the market from any great distance. It reaches a length of about 2 feet and a weight of 8 to 10 pounds, being much the largest of the Cottoids on this coast.

191. *Aspicottus bison* Grd.—*Stone Sculpin*; *Salpa*.

San Francisco northward; exceedingly abundant in Puget Sound in rocky places, and among weeds at small depths in sheltered bays. At Seattle the most abundant of the family. Less common at San Francisco. It feeds chiefly on *Ulva* and other green plants, of which its long intestines are always full. It takes the hook readily with any sort of bait, and therefore probably does not disdain animal food. It reaches a length of about a foot, and is seldom used for food. The European *Cottus bubalis* Euphrasen, with which this species is considered identical by Dr. Günther, is a true *Cottus*, and has no intimate relation to *Aspicottus bison*.

192. *Hemilepidotus trachurus* (Pallas) Gthr.

From San Francisco northward, in similar situations with the preceding, but much less abundant. It feeds chiefly on crustacea. It reaches a length of about 15 inches, being, next to *Scorpenichthys*, the largest Cottoid of our west coast. It is rarely used as food.

193. *Hemilepidotus spinosus* Ayres.—*Capisone*; *Cabezon*.

About San Francisco and Monterey, where it is rather common. Taken chiefly by the Chinese on set-lines in rather deep water. It reaches a length of 9 inches, feeds on crustacea, and is held in no esteem as food.

194. *Artedius pugetensis* Steind.

Puget Sound; not abundant. It feeds on crustacea, etc. It reaches a length of about 9 inches, and is seldom used as food.

195. *Artedius megacephalus* Lockington.—*Chitonotus megacephalus* Lockington. Mining and Scientific Press, San Francisco, 1879.)

Deep water off San Francisco. Distinguished from the preceding by the greatly-elevated anterior portion of the spinous dorsal, the first spine reaching past the front of the soft dorsal. Specimens numbered 27, 185, from Point Reyes, lately distributed by the National Museum as *Artedius pugetensis*, belong to this species.

196. *Artedius quadriseriatus* Lockington.

Only seen about San Francisco, where it is very common in deep water off Point Reyes, being brought in by the sweep-nets, mixed with tom-cod and prawns. It reaches a length of less than 3 inches.

197. *Artedius notospilotus* Grd.—*Sculpin*; *Drummer*; *Salpa*.

Santa Barbara to Puget Sound, most abundant at Santa Barbara. It lives in the kelp, in water of moderate depth, and is mostly taken with the hook. It reaches a length of 4 to 5 inches, and is little esteemed.

198. *Artedius lateralis* Grd. \*

Monterey to Puget Sound, inhabiting the rock-pools with the species of *Oligocottus*; not common anywhere. It reaches a length of about 4 inches. It is readily distinguished from the preceding by the larger mouth and the naked, smooth head.

199. *Cottus polyacanthocephalus* Pallas.—*Sculpin*; *Bull-head*.

Puget Sound and northward; generally abundant; not seen southward. Carnivorous. It reaches a length of 15 inches or more, and although of considerable size is not often used as food. There is much waste in a sculpin, the removal of the head and skin leaving very little meat, and that little comparatively is coarse and dry.

200. *Ascelichthys rhodorus* J. & G.

At Waada Island and other points at the entrance of the Straits of Fuca; exceedingly abundant among the rocks at low tide. Specimens in Mr. Lockington's collection from Gualala, Mendocino County, California. Carnivorous, reaching a length of 3½ inches.

201. *Psychrolutes paradoxus* Gthr.

Puget Sound and northward; a specimen from the Aleutian Islands is in the Museum of the Alaska Commercial Company. It reaches a length of 2 inches.

#### Family AGONIDÆ.

202. *Bothragonus swani* (Steind.) Gill.

Not seen by us; the original specimen from Port Townsend.

203. *Podothecus trispinosus* (Lockington) J. & G.

San Francisco to Santa Barbara; occasionally brought in among prawns to the markets of San Francisco; one specimen dredged at Santa Barbara. It reaches a length of 3 inches.

204. *Podothecus vulsus* J. & G.

About San Francisco in the open sea. Brought into market occasionally with prawns, and sometimes taken in sweep-nets by the *paranzelle*, which are large fishing-boats, sailing in pairs before the wind, drawing a large net behind and between them on the bottom. It reaches a length of  $1\frac{1}{2}$  inches.

205. *Podothecus acipenserinus* (Pallas) Gthr.

Puget Sound and northward; abundant; taken frequently in seines in water of moderate depth. It reaches a length of about a foot.

206. *Brachyopsis xyosternus* J. & G.

Bay of Monterey; abundant in June along the shore about Soquel; not seen elsewhere; taken in seines. It reaches a length of 5 or 6 inches.

207. *Brachyopsis verrucosus* Lockington.

Point Reyes to San Francisco; occasionally brought into the markets with tom-cod or prawns, many being taken in the sweep-nets. It reaches a length of 6 to 8 inches.

208. *Aspidophoroides inermis* Günther.

Described from the Gulf of Georgia; not seen by us.

## Family TRIGLIDÆ.

209. *Prionotus stephanophrys* Lock.

One specimen known, from off Point Reyes.

## Family LIPARIDIDÆ.

210. *Liparis pulchellus* Ayres.

About San Francisco and Monterey, and probably northward, but not seen by us elsewhere. Taken occasionally with seines at Soquel, and sometimes brought into the San Francisco market. It reaches a length of 5 or 6 inches.

211. *Liparis, cyclopus* Günther.

A single young specimen obtained by us at Monterey.

212. *Liparis mucosus* Ayres.

About San Francisco, and probably northward. It reaches a length of 5 or 6 inches.

## Family CYCLOPTERIDÆ.

213. *Eumicrotremus orbis* (Gthr.) Gill.

Described from Esquimault Harbor; not seen by us on the coast. A specimen is in the Museum of the Alaska Commercial Company from the Aleutian Islands.



Family GOBIESOCIDÆ.

214. *Gobiesox reticulatus* (Grd.) J. & G.—*Sucking-fish*.

From Monterey northward to Puget Sound; not noticed southward; very abundant at Point Pinos, and about Cape Flattery, where it lives among the rocks between tide-marks. Its motions in the water are active, but it is usually found clinging to stones. It feeds on small shells and crustacea, and reaches a length of 5 to 6 inches.

215. *Gobiesox rhessodon* Rosa Smith Mss.

Under rocks at Point Loma, near San Diego; locally rather abundant.

Family BLENNIIDÆ.

216. *Hypleurochilus gentilis* (Grd.) Gill.

From Santa Barbara southward; not rare in rock-pools between tide-marks, among algæ. It reaches a length of 5 inches.

217. *Neoclinus blanchardi* Grd.

From Monterey southward, in the kelp; taken occasionally with hook and line. Feeds chiefly on crustacea. It reaches a length of 7 to 8 inches. Seen by us at Monterey, San Luis Obispo, and Santa Barbara.

218. *Neoclinus satiricus* Girard.

Monterey southward; rare. Seen by us at Monterey, only. It reaches a length of a foot, and lives in the kelp.

219. *Heterostichus rostratus* Grd.—*Kelp-fish*.

From Monterey southward; not rare in the kelp south of Point Concepcion. Taken with hook and occasionally with seines. It feeds on crustacea, etc. It reaches a length of about 15 inches. It is sometimes brought to market with other fish, but no special notice is taken of it.

220. *Gibbonsia elegans* Cooper.

From Monterey southward; abundant everywhere in kelp and rock-pools. It reaches a length of 8 inches, and is not noticed by the fishermen.

221. *Cremnobates integripinnis* Rosa Smith.

San Diego to Mazatlan; the specimens from our coast found in rock-pools near La Jolla, 12 miles north of San Diego, among algæ between tide-marks. Length  $2\frac{1}{2}$  inches.

222. *Murænoides ornatus* (Grd.) Gill.—*Eel*.

San Francisco northward; abundant in Puget Sound. Found in rock-pools in sheltered places and sometimes taken in seines. It reaches a length of a foot. It is not considered a food-fish. The form called *M. lextus* is considerably more abundant than the typical *ornatus*. They two differ only in the form of the dorsal blotches and are, probably, not distinct species.

223. *Apodichthys fucorum* J. & G.

Monterey to Puget Sound; very abundant at Point Pinos; less common about Cape Flattery. It is very abundant in the *Fucus* between tide-marks, especially where thick bunches of the slender *Fucus* hang from rocks into a little pool of water. At Monterey large numbers may often be shaken from a tuft of *Fucus*, at considerable distance from the water. Its movements are exceedingly active, more so than those of other eel-shaped blennies. It reaches a length of 5 or 6 inches.

224. *Apodichthys flavidus* Grd.

San Luis Obispo to Puget Sound, in rock-pools and in the kelp. Frequently taken with seines. It reaches a length of over a foot, and is remarkable for its brilliant colors, which vary from bright green to orange and violet with its surroundings. It feeds, like the three preceding species, on crustacea and small shells.

225. *Anoplarchus alectrolophus* (Pallas) J. & G.

From Monterey northward; most abundant in Puget Sound. It inhabits the region between tide-marks, where it is sheltered from the surf. It is usually found among weeds and stones where the bottom is very muddy. It reaches a length of about 8 inches. Pyloric cæca are present in this species, as in the species of *Xiphister* and *Cebedichthys*. They are wanting in *Apodichthys* and *Muraenoides*.

226. *Xiphister chirus* J. & G.

From Monterey northward; more abundant about Puget Sound. It inhabits the region about low-tide mark, among rocks or mussel shells which are exposed to the action of the waves. Like the others of the genus it is strictly herbivorous, feeding on red or green algæ. It reaches a length of 6 to 8 inches.

227. *Xiphister mucosus* (Grd.) Jor.

From Monterey northward; everywhere very abundant among loose rocks between tide-marks. It feeds on algæ, and reaches a length of about 20 inches. Occasionally brought into the San Francisco market, where it sells at 30 cents per pound.

228. *Xiphister rupestris* J. & G.

From Monterey northward; everywhere very abundant with the preceding. It reaches a length of about a foot.

229. *Lumpenus anguillaris* (Pallas) Gill.—*Eel*.

From Northern California northward; exceedingly abundant in Puget Sound, where it inhabits sandy shores in water of moderate depth. It feeds chiefly on algæ. It reaches a length of 20 inches. It is occasionally brought into the markets, but is not valued as food, and apparently seldom eaten, its looks being against it.

230. *Anarrhichthys ocellatus* Ayres.—*Eel*; *Morina*; *Azia*; *Wolf Eel*.

From Monterey northward; not rare, but not very abundant. It feeds on crustacea and fishes. It reaches a length of 8 feet and a weight of at least 25 pounds. It is sent to the markets and brings a fair price.

Family BATRACHIDÆ.

231. *Porichthys porosissimus* (C. & V.) Grd.—*Mud-fish*; *Cat-fish*; *Drummer*; *Singing fish*.

Exceedingly abundant the entire length of the coast in shallow, muddy, or weedy bays, often under stones. It reaches a length of somewhat more than a foot, and is never used as food.

Family ZOARCIDÆ.

232. *Lycodopsis paucidens* (Lockington) Gill.

San Francisco and northward; not very common; brought in with the tom-cod taken in sweep-nets off Point Reyes. It reaches a length of about 10 inches. No notice is taken of it as a food-fish.

233. *Lycodopsis pacificus* Collett.

San Francisco northward, with the preceding; abundant in Puget Sound. Distinguished only by the smaller head and mouth.

Family CONGROGADIDÆ.

234. *Scytalina cerdale* J. & G.

In loose stones near low-tide mark, on Waada Island, near Cape Flattery. It reaches a length of about 6 inches. It is exceedingly active in life.

Family OPHIDIIDÆ.

235. *Ophidium taylori* Grd.

San Francisco to Santa Barbara; not very common; taken in sweep-nets with tom-cod, etc., about San Francisco, and sometimes brought into the markets. It reaches a length of about 14 inches, and no special notice is taken of it.

Family BROTULIDÆ.

236. *Brosmophycis marginatus* (Ayres) Gill.—*Cusk*; *Mustela*.

San Francisco and northward; rare; occasionally brought into the San Francisco market, and from its bright colors readily salable. It reaches a length of nearly 18 inches.

Family GADIDÆ.

237. *Microgadus proximus* (Grd.) Gill.—*Tom Cod*; *Whiting*.

Monterey to Puget Sound; very abundant from San Francisco northward, and taken in immense numbers in seines and sweep-nets. Its flesh is somewhat watery and tasteless, yet it meets with a ready sale. It reaches a length of about a foot and a weight of about  $\frac{1}{2}$  pound.

**238. *Gadus morrhua* L.—*Alaska Cod*.**

Straits of Fuca and northward; abundant on certain banks; probably occurring off the coast of Oregon.

**239. *Pollachius chalcogrammus* (Pallas) J. & G.**

(*Gadus periscopus* Cope.)

Monterey and northward; occasionally taken with hook in deep water about Seattle with *Bathymaster signatus*; very rare about San Francisco. It reaches a length of about 2 feet.

**240. *Merlucius productus* (Ayres) Gill.—*Merluccio*; *Horse Mackerel*.**

Santa Cruz Island northward; very abundant at certain seasons, especially at its spawning time in the spring, when it is taken in great numbers in the gill-nets at Monterey, Soquel, and elsewhere. Its distribution is irregular, being very abundant some years but at other times extremely scarce. It is extremely voracious, feeding on all sorts of small fishes and squids, its stomach being always full. It ranks low as a market fish, as its flesh is extremely soft, and it is always ragged-looking when shipped. It reaches a length of rather more than 2 feet and a weight of 10 pounds.

### Family PLEURONECTIDÆ.

**241. *Atheresthes stomias* J. & G.**

San Francisco and northward; the only specimens taken by us were from between Point Reyes and the Farallones. It reaches a length of 30 inches and a weight of 5 or 6 pounds, being probably the slenderest flounder known.

**242. *Hippoglossus vulgaris* Fleming.—*Halibut*.**

From San Francisco northward; not abundant south of the Straits of Fuca. There is a large halibut bank near Cape Flattery, and considerable numbers are taken in the deeper channels of the sound by means of hook and line. It reaches a length of 5 or 6 feet and a weight of 200 pounds or more. It feeds on codfish and any other large fish which it can take. Its flesh is much esteemed.

**243. *Xystreurus liolepis* J. & G.**

Santa Barbara and southward; not very rare, in moderately deep water and about the kelp. It reaches a length of about 14 inches and a weight of a little over 2 pounds.

**244. *Paralichthys maculosus* Grd.—*Monterey Halibut*; *Bastard Halibut*; *Flounder*.  
(*Uropsetta californica* Gill.)**

Tomales Bay southward; abundant from Monterey to San Diego, being the most abundant flounder south of Point Concepcion, the young swarming in all the bays, the adult comparatively rare. It reaches a length of nearly 3 feet and a weight of 60 pounds, the largest seen by

us weighing 55 pounds. The large ones are taken chiefly in gill-nets. As a food-fish it is considered rather inferior to the others, the large ones being tough and coarse.

**245. *Hippoglossoides jordani* Lockington.—*Sole*; *Soglia*.**

Monterey to Puget Sound; rare northward, but very abundant about San Francisco. At Monterey it is the most abundant species. It is considered one of the best of its family. Great numbers are salted, hung up by the tails, suspended above the roofs, and dried, by the Chinese. It reaches a length of 18 inches and a weight of 3 to 5 pounds.

**246. *Hippoglossoides elassodon* J. & G.**

Puget Sound and northward; not uncommon about the wharves of Seattle and Tacoma, where it is taken with hook and line. It reaches the length of about a foot and a weight of at least 2 pounds.

**247. *Hippoglossoides exilis* J. & G.**

San Francisco to Puget Sound, in deep water. Taken about Point Reyes with sweep-nets, at certain times, in enormous numbers. Less common about Seattle. A small species; none seen over 9 inches in length, weighing about  $\frac{3}{4}$  pound. It is not valued, the flesh being soft. Most of those taken by the paranzelle are thrown away.

**248. *Psettichthys melanostictus* Grd.—*Sole*.**

From Monterey to Puget Sound; everywhere common, but not so abundant as some other species. It is considered the best of the flounders for the table. It reaches a length of nearly 20 inches and a weight of 4 to 5 pounds.

**249. *Citharichthys sordidus* (Grd.) Gthr.—*Plaice*.**

Entire coast; most abundant northward; rather rare south of Point Concepcion. It frequents rather deep water, and is best taken with hook or sweep-net. It is one of the smaller species, rarely weighing more than 1½ pounds, and its flesh is comparatively soft. Many are dried by the Chinese, who do not find it necessary to hang them up as in the case of the larger "sole", but dry them upon tables.

**250. *Parophrys isolepis* (Lockington) J. & G.—*Sole*.**

From Monterey to Puget Sound, in rather deep water: not rare; large numbers are brought into the San Francisco market, being taken in the sweep-nets about Point Reyes. It reaches a length of 15 inches and a weight of 3 pounds, although usually much smaller.

**251. *Parophrys ischyryus* J. & G.**

Puget Sound; not common; the four specimens seen taken near Seattle with a seine. It reaches a length of 18 inches and a weight of about 4 pounds.



**252. *Parophrys vetulus* Grd.—*Sole*.**

Santa Barbara to Alaska; very abundant from Monterey northward to Puget Sound. It is usually one of the smallest species, reaching a length of about 14 inches and a weight of 2 or 3 pounds. Most of those seen in the markets weigh about half a pound. It is one of the principal market species, and usually sells well.

**253. *Lepidopsetta bilineata* (Ayres) Lock.—*Rock Sole*.**

Monterey to Alaska; rather common about rocky places, and abundant in Puget Sound; considerable numbers are taken with set-lines by the Chinese at Monterey. It reaches a length of 18 inches and a weight of 3 to 5 pounds.

**254. *Pleuronectes stellatus* Pallas.—*Flounder*.**

From San Luis Obispo northward; everywhere very abundant, especially northward and about the mouths of rivers; the commonest flounder on the coast. It is reckoned a good food-fish when not too large. It reaches a length of 2 feet and a weight of at least 10 pounds.

**255. *Glyptocephalus zachirus* Lockington.—*Sole*.**

About San Francisco and Monterey, in rather deep water; taken chiefly with the sweep-nets, its mouth being too small for the hook and its habitat too deep for the gill-nets. It reaches a length of 18 inches and a weight of about 2 pounds, and is considered excellent food.

**256. *Cynoglossus pacificus* (Lock.) J & G.—*Sole*.**

Monterey to Puget Sound, in rather deep water; generally abundant; taken chiefly in the sweep-nets. Rather common at Seattle, and often brought in immense numbers from the sweep-nets to the San Francisco markets. It spawns in May and June. It reaches a length of a little more than a foot and a weight of 2 pounds. This species is excessively slimy when taken out of the water. It is considered as a good food-fish when large. The small ones, taken so abundantly, are little valued.

**257. *Hypsopsetta guttulata* (Grd.) Gill.—*Turbot; Diamond Flounder*.**

Tomales to San Diego; widely distributed, but not so abundant anywhere as most of the other species. Considerable numbers are brought to the San Francisco market, but none have been noticed by us in Monterey Bay. It reaches a length of nearly a foot and a weight of about 3 pounds.

**258. *Pleuronichthys cænopus* Grd.**

San Diego to Alaska, in deep water; not very abundant anywhere south of Puget Sound, where it is quite common. It is chiefly herbivorous, like the other species of the genus, and with them spawns in May to July. It reaches a length of about a foot and a weight of 2 to 3 pounds. It is rarely seen in the San Francisco markets.

**259. *Pleuronichthys decurrens* J. & G.**

Monterey and San Francisco (and northward?), in deep water. Large numbers taken in sweep-nets about the Farallones and brought into the San Francisco markets. In size, food, and habits similar to the preceding, but more abundant.

**260. *Pleuronichthys verticalis* J. & G.**

Monterey and San Francisco, in deep water; taken at Monterey in considerable numbers in the spawning season by means of gill-nets. It is similar in size, feed, and habits to the others, but most specimens seen in the markets are of smaller size.

**261. *Aphoristia atricauda* J. & G.**

Numerous specimens, 3 to 5 inches long, taken at San Diego.

**Family AULORHYNCHIDÆ.****262. *Aulorhynchus flavidus* Gill.**

Monterey to Puget Sound, in large schools in sheltered bays near the shore; not common southward. It reaches a length of 5 to 6 inches.

**263. *Gasterosteus microcephalus* Grd.—*Stickleback*.**

(*Gasterosteus plebeius* and *pugetti* Grd.)

In rivers and brackish waters from Los Angeles River to Puget Sound; commonest southward. Length 2 inches.

**264. *Gasterosteus aculeatus* var. *cataphractus* (Pallas) J. & G.—*Stickleback*; *Salmon Killer*. (*Gasterosteus serratus* Ayres; *Gasterosteus insculptus* Rich.)**

In salt water, entering rivers from San Francisco to Alaska; very common northward. Length  $2\frac{1}{2}$  inches.

**Family SYNGNATHIDÆ.****265. *Siphostoma californiense* (Storer) J. & G.—*Pipe-fish*.**

Santa Barbara to Puget Sound; the form called *S. griseolineatus* from San Francisco northward, the other southward and generally common; most common at Soquel. It reaches a length of 15 to 18 inches.

**266. *Siphostoma leptorhynchus* (Grd.) J. & G.**

Santa Barbara to San Diego; not very common except in San Diego Bay. It reaches a length of less than a foot.

**267. *Siphostoma punctipinne* (Gill) J. & G.**

Only the original types, from San Diego, are yet known.

**Family HIPPOCAMPIDÆ.****268. *Hippocampus ingens* Grd.—*Sea Horse*.**

San Diego; rare. Reaches a length of about a foot.

## Family TETRODONTIDÆ.

269. *Cirrhisomus politus* (Ayres) J. & G.

Not obtained by us. A specimen in collection of California Academy, from San Diego.

## Family DIODONTIDÆ.

270. *Diodon maculatus* Lac.

One specimen, from near San Diego.

## Family ORTHAGORISCIDÆ.

271. *Mola rotunda* Cuvier.—*Sunfish*; *Mola*.

Abundant in Santa Barbara Channel in summer; often seen playing near the surface, and even leaping from the water; not often taken, as they are not easily caught and not used for food. Reaches a weight of 200 pounds or more.

UNITED STATES NATIONAL MUSEUM,  
December 1, 1880.

## DESCRIPTION OF SEBASTICHTHYS MYSTINUS.

By DAVID S. JORDAN and CHARLES H. GILBERT.

*Sebastichthys mystinus*.

*Sebastes variabilis* Ayres, Proc. Cal. Acad. Nat. Sci. i, 7, 1854 (not of Pallas, = *Epinephelus ciliatus* Tilesius).

*Sebastodes melanops* Ayres, Proc. Cal. Acad. Nat. Sci. ii, 216 (in part; probably not the figure 66, which more resembles *S. melanops*; not *Sebastes melanops* Girard, = *Sebastosomus simulans* Gill).

*Sebastichthys melanops* Jordan & Gilbert, Proc. U. S. Nat. Mus. iii, 1880, 289, and elsewhere.

*Sebastichthys mystinus* Jordan & Gilbert, Proc. U. S. Nat. Mus. iii, 1880, 445; 1881, 8.

Two species have been confounded by previous writers under the name of *Sebastes* or *Sebastosomus melanops*. The one, darker in color, with smaller mouth and black peritoneum, is found from Puget Sound to San Diego, being most common southward, and is perhaps the most abundant species of the genus on the coast. The other, paler and more spotted, with larger mouth and white peritoneum, ranges from Monterey to Sitka, being most common northward. The first is the "Pêche Prêtre" of the Monterey fishermen, the second the "Black Bass" of the anglers of Puget Sound. The first is referred to by us as *Sebastichthys melanops* on page 289 and elsewhere in these Proceedings (Vol. III); the second as *Sebastichthys simulans*. The original description by Girard of his *Sebastes melanops*, however, can refer only to the second fish, as is shown by the following statements (U. S. Pac. R. R. Expl. Fishes, 81):

"Upper surface of head spineless;" "the posterior extremity of the maxillary, very much dilated, extends to a vertical line drawn inwardly to the posterior rim of the orbit." "The pectorals are broad; \* \* \* the tip of these fins extends almost as far as the tip of the ventrals." "The upper surface of the head and of the dorsal region above the lateral line are almost black, or else of a purplish black. The side of the body is yellowish, with an irregular purplish black spot upon nearly all the scales. The side of the head is of a lighter purplish black. The inferior region is of a soiled yellow, though of a metallic hue. The fins are unicolor, of dark purple tint." The "Pêche Prêtre" has a preorbital protuberance, which usually ends in a spine; the "Black Bass" has neither protuberance nor spine. The mouth is smaller in the "Pêche Prêtre", the maxillary barely extending to the posterior margin of the pupil. The pectoral fins are longer in the "Pêche Prêtre", extending past the tips of the ventrals; in the other not so far. And, finally, omitting the expression "purplish", which scarcely applies to any rock-fish, the account of the color describes the "Black Bass", but not the "Pêche Prêtre".

Furthermore, the original type of Girard's description, the large specimen from Astoria, is still preserved in the National Museum, and its identity with the species formerly called by us *S. simulans* is undoubted. The original type of the name *Sebastosomus simulans* is also preserved. It belongs to the same species, differing only in having the lower opercular spine somewhat less conspicuous than usual. The northern fish, the "Black Bass" of Puget Sound, must, therefore, retain the name of *Sebastichthys melanops*, of which name *simulans* is a synonym, while the "Pêche Prêtre" may receive the new name of *Sebastichthys mystinus*. *Sebastichthys ciliatus* (*Epinephelus ciliatus* Tilesius = *Perca variabilis* Pallas) is related to both species, but distinct from both, having the black peritoneum of *mystinus*, but lacking the bulge of the preorbital region. The mouth is larger than in *mystinus*, but smaller than in *melanops*, while the coloration is different from both.

#### DESCRIPTION OF SEBASTICHTHYS MYSTINUS.

Body oval-oblong, compressed, both dorsal and ventral outline evenly curved. Head conic, compressed, the profile almost straight. Mouth comparatively small, oblique, the lower jaw protruding; mouth entirely below the axis of the body; premaxillaries on the line of the lower rim of the orbit; maxillary thickly scaled, reaching to opposite posterior margin of pupil; mandible scaly.

Top of head without spines, with the exception of the very small nasal pair, and sometimes a preocular pair; the interorbital space perfectly arched, and the entire top of the head covered with very small, crowded scales; the preocular ridge forming a projection over the upper anterior angle of the orbit. The forehead between the preocular ridges is notably full and convex. The occipital ridge forms two slightly di-



verging ridges under the scales. Preorbital with a small spine, which is sometimes obsolete.

Preopercle with rather strong spines, the two at the angle longest. Opercle with two strong spines. Suprascapular spines present.

Gill-rakers numerous, long and very strong, their length half the diameter of the eye, their number about  $\frac{9}{2}$ .

Scales smaller than in most of the species, in about 66 transverse series.

Spinous dorsal low, the fourth to seventh spines highest, all lower than the soft dorsal, the fin not deeply emarginate. Third anal spine slightly longer than the second, but not so strong. Caudal fin emarginate. Pectoral fins long, reaching beyond the tips of the ventrals to the base of the tenth dorsal spine. Ventrals not reaching to the vent.

Fin rays: D. XII, 1, 15; A. III, 9.

Color slaty black, becoming lighter below the lateral line. Belly scarcely pale. Sides often somewhat mottled. Tip of lower jaw black. Top of head with three indistinct cross-bars: one in front of eyes, continued around anterior rim of orbit, and extending backwards across the cheeks; one between the orbits, reappearing below in a second oblique cheek-band; the third across occiput, extending obliquely backwards to the upper angle of the opercle. Fins plain dusky.

Peritoneum black, as in *S. ovalis*, *S. entomelas*, and *S. ciliatus*. In *S. melanops* and its near relative *S. flavidus* the peritoneum is always white.

UNITED STATES NATIONAL MUSEUM, January 5, 1881.

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**DESCRIPTION OF A NEW SPECIES OF PTYCHOCHILUS (PTYCHOCHILUS HARFORDI), FROM SACRAMENTO RIVER.**

**By DAVID S. JORDAN and CHARLES H. GILBERT.**

*Ptychochilus harfordi*, sp. nov.

Allied to *Pt. oregonensis* (Rich.), but with much smaller scales.

Body long and slender, little compressed, the back not elevated, the caudal peduncle large and stout. Greatest depth of body contained  $5\frac{3}{4}$  times in its length from snout to base of caudal. Head long, pike-like, subconic, rather slender, broad and depressed above. Length of head contained 4 times in length to base of caudal. Mouth terminal, oblique, the lower jaw somewhat projecting. Premaxillary anteriorly on the level of the eye. Maxillary, as in other species, closely adherent to the preorbital, except near its end, where it slips under the preorbital, its tip extending just beyond the vertical from the front of the eye. Length of cleft of mouth contained  $2\frac{3}{4}$  times in length of head. Interorbital width  $3\frac{3}{4}$  times in the length of head. Eye small, placed high, its diameter contained 3 times in the length of the snout, 10 times in that of the head. Cheeks very broad. Lips normal, as in other species of the



genus. Gill-rakers very short. Pseudobranchiæ large. Gill-membranes in one specimen united and wholly free from the isthmus; in the others joined as usual in *Cyprinidæ*. The condition in the first specimen is doubtless abnormal. Pharyngeal bones and teeth as in the other species of the genus; the teeth 2, 4-5, 2, slender, hooked, without grinding surface.

Scales 17-90-9, those on the back and belly rather smaller than the others, those on the breast imbedded. Lateral line very strongly decurved, its lowest point scarcely above the line of insertion of the pectoral fins.

Dorsal fin inserted at a point midway between eye and base of caudal, a little behind the insertion of the ventrals. Caudal short and deep, not strongly forked, the lobes equal, the accessory rays not numerous. Pectorals not large, extending three-fifths the distance to the ventrals, which reach two-thirds the distance to the vent. Anal fin small. Dorsal rays I, 8; anal I, 7.

This species reaches a length of nearly 3 feet. It is brought into the markets of San Francisco in considerable numbers in the winter, in company with the closely related and still larger species *Ptychochilus oregonensis* (*Pt. grandis* Ayres), with which species it has been hitherto confounded. The latter species is, however at once distinguished by its larger scales, the usual number being 12-75-6. *Ptychochilus rapax* Grd. has the larger scales of *Ptychochilus oregonensis*, and the lateral line is represented as little decurved, the scales more loosely imbricated; and *Pt. lucius* Grd., from the Colorado River, is represented as having the scales still smaller than in *Pt. harfordi*, while "*Ptychochilus vorax* Grd." is not a member of this genus at all, but belongs to the group called *Gila*.

We have named this species for Mr. W. G. W. Harford, curator of the California Academy of Sciences, who has taken much interest in the development of the ichthyology of California, and to whom the National Museum has been indebted for many favors.

The typical specimens, four in number, are entered as No. 27246 on the Museum Register. The largest one is about 18 inches in length, the others a little smaller. They were obtained by the writers in the San Francisco market, and were taken in the Sacramento River.

UNITED STATES NATIONAL MUSEUM, January 5, 1881.

#### NOTE ON *RAIA INORNATA*.

By DAVID S. JORDAN and CHARLES H. GILBERT.

Four species of the genus *Raia* are known from the Pacific coast of the United States. One of these was described by Girard, under the name of *Raia binoculata*, in the Proc. Acad. Nat. Sci. Phila., 1854, p. 196, and later under the name of *Uraptera binoculata*. The description con-

tains little that is characteristic, and the typical example seems to be lost. We have, however, no doubt that it was based on a young individual of the large skate called by us, on page 252 and elsewhere in these Proceedings (Vol. III), *Raia cooperi*. The presence of the single spine on the median line of the back anteriorly, as described by Girard, is one of the most constant diagnostic characters of the young of this species, and we have never found less than three or four such species in the corresponding position in the species called by us hitherto *Raia binoculata*.

The *Raia cooperi* of Girard is based on a drawing by Dr. Cooper, and the great size is the only diagnostic character assigned to it. As three of the species reach a length of but 30 inches and the other a length of 6 feet, we have no difficulty in making an identification with the species described by us as *Raia cooperi* on page 252. *Raia binoculata* of Girard is thus probably the young of *Raia cooperi* of Girard. The large skate should therefore be called *Raia binoculata*, while the species described by us on page 134 of the Proceedings as *Raia binoculata* may receive the new name of *Raia inornata*.

Specimens of this species obtained at Santa Barbara represent a marked variety, distinguished by the small number and feebleness of the spines and prickles, and in the presence (in the females) of a band of small prickles on the posterior part of the pectorals, parallel with the edge. Suprocular spines almost obsolete. Two or three minute prickles often present on the median line at the shoulders. A series of minute stellate prickles beginning near the middle of the back, becoming hooked spines on the tail. Lateral caudal spines scarcely developed, even in the female. A band of small prickles on the posterior part of the back. Males almost smooth. Size and color as in *R. inornata*. This form may be known as var. *inermis*.

UNITED STATES NATIONAL MUSEUM, January 13, 1881.

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#### ON THE FISH-MORTALITY IN THE GULF OF MEXICO.

By ERNEST INGERSOLL.

SIR: Pursuant to your verbal suggestion, I made it an object, during my recent cruise down the western coast of Florida in the service of the Superintendent of the Census, to inquire into the so called "poisoned water" which was supposed to have caused the remarkable mortality among the sea-fishes that occurred in the autumn of 1880. I am sorry to be able to give so meagre an account of the matter as follows; but must beg excuses on the plea that I was too late to see any actual destruction, since the cause had wholly disappeared previous to my arrival there, and also from the fact that I was unable to carry out my intention of going to Key West, where most of the fishermen live who suffered injury, and who could perhaps have furnished additional information.

It appears that this misfortune is not a new experience in the eastern part of the Gulf of Mexico. One of the oldest residents on the Floridan coast, Mr. Benjamin Curry, of Manatee, told me, what others confirmed, that as far back as 1844 a wide-spread destruction of all sorts of salt-water animal life occurred, apparently due to causes precisely similar to those which produced the lately noticed desolation. Again, in 1854 the fishes suffered all along the southern shore, and have done so at intervals since to a less degree, until in 1878 an excessive fatality spread among them, which was wider in the extent of its damaging effects and probably more destructive in point of number of victims than the later visitation of 1880. Even the cooler half of 1879 was not exempt from some appearance of the plague.

In regard to some of the manifestations of this deadly influence in the sea during 1878, Mr. John Brady, jr., an intelligent captain, told me that the time of year was January, and that the "poisoned water", to which universal belief credits the death of the fishes, could easily be distinguished from the clear blue of the pure surrounding element. This discolored water appeared in long patches or "streaks", sometimes 100 yards wide, drifting lengthways with the flow of the tide. The earliest indication of it was the floating up of vast quantities of dead sponges—chiefly "loggerheads". All those seen by Mr. Brady were less than 40 miles north of Key West, in what is known as "The Bay", nor has anything of the sort been seen at any time outside (*i. e.*, southward or eastward) of the Florida Reefs; but it was soon discovered that all the hitherto profitable sponging grounds lying off the coast as far north nearly as Cedar Keys, and particularly off the Anclotes, had been ruined. These grounds are only now beginning to show signs of reproductiveness in sponges. At the same time, many portions of this area—for example, Sarasota Bay—seem not to have been affected, sufficiently at least to cause the death of swimming fishes to any great extent. In the case of the sponges, only a few of other species than the loggerhead would be seen floating; but when they were hooked into, all were found dead, though still clinging to the bottom. When a sponge dies naturally it gradually becomes white at its base, through the loss of its sarcodal matter, but all these were observed to have turned black. The abandonment of these sponging grounds from the Reefs to Cedar Keys, during the three or four years following this attack, entails a loss which it is hard to estimate, because partially compensated in the increased price of the article in the market due to its consequent scarcity, and because at all times the product there is an uncertain quantity; but I hazard the opinion that \$100,000 would not repair the damage to this business interest alone. Had it not been for the fortunate discovery just at that time of the sponge-tracts off Rock Island, northward of the Suwanee River, almost a famine in this article would have ensued.

Concerning the attack of 1880 I am able to say more. It began suddenly, and immediately followed the terrible hurricane which is known

as the "August gale", the fish and all other ocean life suddenly dying in hordes all along the southern (eastern) shore of Tampa Bay, on Egmont Key, at its mouth, which was the most northern point, and thence southward as far as Shark River, in Whitewater Bay, on the coast. Thence fatal localities were to be found in the currents that set southward through Bahia Honda Passage, through the Northwest Passage beyond Key West, and even out in the neighborhood of the far-isolated Tortugas.

Everywhere throughout this whole extent of coast, except in the mouths of the rivers and in the shallow bayous, all the forms of sea-life died as though stricken with a plague fatal alike to all, and were drifted upon the beaches in long windrows so dense that near human habitations men were obliged to unite in burying them to prevent a pestilential stench, or to haul them away by wagon-loads to be prepared for manure, as was done in some cases. Not only were swimming fishes destroyed, but sponges, crabs (I saw upon the beaches thousands of horseshoe-crabs laden with their chains of undischarged eggs), and great numbers of mollusks. The oysters at the mouth of Manatee River and in Tampa were spoiled (in imagination if not in fact!), and the excellent clams of Sarasota Bay became weak, tasteless, and of a repulsive green hue at their edges. A graphic account has been given me in a letter received from Mr. Charles Moore, jr., keeper of the light-house on Egmont Key, at the entrance of Tampa Bay, the original of which I transmit herewith. This point witnessed the height of the calamity, and as Mr. Moore was present during the whole season, his account of facts is valuable. Mr. Moore writes:

EGMONT KEY, FLA., *February 20, 1881.*

SIR: As I promised to give you all the information about the fish dying at this station, I will do so to the best of my ability. The first dead fish we saw was on Sunday, October 17, as the tide came in. There were thousands of small fish floating on the water, most of them quite dead. I saw only one kind the first day; they were small fish, four or five inches long; the Key West smackmen called them "brim". They were a new fish to me. The next day other kinds were dying all along the shore; the pompano was about the next to give in, and by the 25th October nearly all kinds of fish that inhabit these waters were dying, except the ray family. I don't remember of ever seeing any stinger or whipper ray, or the devil-fish, as we call the largest ones of the ray family. From the 25th of October to the 10th of November was the worst time; during that time the stench was so bad that it was impossible to go on the beach. I sent my family to Manatee, and the assistant keeper and myself shut ourselves up in our rooms and kept burning tar, coffee, sulphur, rags, etc., night and day in order to stand it. It was warm, damp, and calm weather. They continued to die for about six weeks; they kept getting less every day. I counted seventy sharks



within 80 yards, all small; I never saw a shark over four feet long dead. The cow-fish and eels were about the last to die. In regard to the cause of their dying, I have made up my mind it was caused by the fresh water, as there was immense quantities of fresh water coming down the bay, and the water here was nearly fresh on the surface, while the water underneath was perfectly salt. Now, if the fresh water could have passed off into the Gulf without being disturbed by winds, and it would have naturally spread out thinner and thinner as it would have rolled on towards the Gulf Stream, and once it got there, then there would have been no trouble. But on the 7th of October we had a heavy gale from the southwest, and it continued to blow from the south and west until the 11th of October, and a very heavy sea running at the mouth of the bay, and it *churned* the fresh and salt water all up together, and the strong southerly winds set this mixed water back and kept it here for several days. I noticed, a few days before the fish commenced to die, a peculiar smell on the water, something like the smell of bilgewater, and the color of the water was a dirty green, mixed with small sediment. I noticed the fish while they were dying, when they first come in shoal water; they would act crazy, dart around in every direction, but in a short time would give up and float ashore. On examining them I found their gills all glued together with a slimy substance and of a whitish color,\* and in a short time the gills would turn green and the fish bloat very large. I cannot make any correct statement as to the number that died, but thousands of barrels floated up on this island. There are no fish dying now; all we catch are fat and nice. I should have written to you before, but I have been very busy. I've had a new duty to perform, taking the tide every half hour. Any information I can give you at any time I will be happy to do so.

My address is: Braidentown, Manatee County, Florida.

Very respectfully,

CHARLES MOORE, JR.,  
*Keeper of Egmont Light-House.*

ERNEST INGERSOLL,  
*U. S. Fish Commission,  
Washington, D. C.*

Along this region of the Florida coast are several establishments or "factories" devoted to the catching and salting of fish, chiefly the mullet and its roe, and to the making of superphosphates. All of these were obliged to suspend operations, and their winter's work has been ruined, or at least all the profits are gone. One gentleman told me of a single definite loss he had thus suffered of \$800.

To this part of the coast, also, comes a large fleet of smacks and "smackees" every winter to catch fish for the Key West and Havana

\* I failed to find any other instance in which this thickening or beginning of the gills had been observed. The dead fish were elsewhere reported as healthy in appearance, and in one case, at least, were eaten without harm, or even indigestion occurring.—E. I.



markets, principally the latter. These smacks found that, as before, the brownish, discolored water, "thick and glutinous" (as one described it), which seemed the cause of the mischief, lay in streaks drifting with the tide. The small fishes that swam into one of these patches (which had a vertical thickness apparently coextensive with the depth of the sea at that place) seemed unable to get out before they were stupefied, and died as though by suffocation. Even the large carnivorous swimmers, like the sharks and porpoises, often suffered the same fate, though frequently they would have strength to turn back and flounder out. In the pure element, between the deadly streaks, fish were as abundant as ever at the distance from the coast where the smacks operated, and their wells were often filled with promptness; but it was found that it was impossible, even by going straight out to the Tortugas, to run the gauntlet of the poisoned water floating between there and Cape Sable, since if once it was encountered, and entered the well, a very few minutes sufficed to bring about the death of every fin of the cargo. I have a few notes, culled from the Key West journals, which show that a loss of nearly \$10,000 resulted from only four or five such misfortunes. The consequence was that for some weeks the fishing throughout all that part of the Gulf had to be wholly abandoned, involving the idleness of a large number of vessels and their crews.

Seeking an explanation of the phenomenon, I everywhere asked what was the local theory to account for the matter, and was almost always told with confidence that it was due to an overflow of swamps and the pouring into the Gulf of bodies of fresh water poisoned by a decoction of noxious "acids", etc., leached from the roots which had been soaking for years in the pent-up floods—a theory which I fail to find supported by such facts as I have been able to learn.

Those who *do* put faith in the sufficiency of this explanation, point out that the winter of 1877-78 was unusually wet, and that this last fall saw more rain falling in South Florida than ever before in the recollection of the people there. This is probably true; and it may be, as asserted, that the years heretofore when fish have died have been those noted for their excessive rainfall, but I have not compared meteorological records. It is no doubt true also that if a sea-fish should be plunged into water saturated with the tannin derived from decomposing roots and stems of palmetto, oak, sumach, etc., which do abound in the Everglades, he would find it eminently unhealthy. But further than this the hypothesis will not hold. It requires us to believe that the overflow of a small surface of swamp-land shall so tincture the wide area of the Gulf as to destroy its healthfulness through several weeks, while the tides are ceaselessly swinging back and forth, and rapid currents continuously replace the water of every part with new and send the old elsewhere. This is preposterous. Moreover, provided it was true of the Manatee River (as is claimed), or of the Caloosahatchie farther south, why should it not equally be true of the Atlantic coast,

where there is the same or greater drainage, yet no such trouble known; or of the Withlacoochee, Suwanee, and a dozen other streams draining swamps like the Ofeekinofee, in whose tangled recesses grow plants as noxious as those farther south, yet whose discharging currents do no harm to the fishes? Moreover, in the Manatee River itself no fish were killed above the free range of the tides, though daily breasting the swamp overflow.

Some, discarding any theory of the decoction of poison from plants as an explanation, will tell you that the excess of rainwater discharged by the rivers so freshened the surf as to cause the death of all shore-swimming fishes. This, as near as I can make it out, is Mr. Moore's explanation of the mortality at Egmont Key.

In a few confined spots, where fishes could not escape at will, this might now and then cause a death; but it is notorious that the fishes of the Gulf coast make little or no distinction between salt and fresh water. Alligators swim to the outermost keys, and the best sheeps-head caught are those far up the Caloosahatchie, where the stream is always sweet, while the porpoise and shark chase the mullet away in toward the head of the bayous, or until the river-channel gets too shallow for them to swim farther. A little fresh water, or a good deal, more or less, would receive no attention whatever from a Floridan fish. The Mississippi has been deluging the Gulf with a well-nigh Amazonian volume of water; fresh not only, but thick and nasty, yet no one supposes the fishes off the delta are obliged to stay in its murky flood unless they choose, or, if they do, that they suffer by it, except to the palate of the epicure.

But a more cogent argument, from facts perhaps overlooked heretofore, exists against any theory which seeks to explain the destruction of marine life inside the Florida reefs by any landward agency. This is that it was in all cases the dwellers on the bottom that perished first, while the surface-feeders were the last to be affected, and as a rule escaped altogether. (Until 1880, I was told, no mullets were ever known to be killed.) It was the death of sponges, conchs, sea-anemones, crawling horseshoe-crabs, of toad-fish, cow-fish, skates, and the like, which keep close down on the bottom, that first apprised the fishermen of the presence of their dreaded and mysterious enemy. Next came the bodies of red-fish, groupers, pompanos, and other deep swimmers, and last of all a few mullets and sharks. Fresh water, tintured with tannin or untintured, would not effect this. It would float on the surface, having a lesser density. If it exerted a noxious influence it would be the surface-life that would first succumb, the bottom-life longest escape. But quite the reverse has been the case, and this, with other appearances, leads to the conclusion that the "poison" springs from the bottom of the sea, or is formed in its waters.

The only way to account for this is by supposing that eruptions of volcanic gases may have taken place through the bottom of the sea

along a line stretching from Tampa Bay to the Tortugas, and through the western half of the Florida Keys. Inquiring as well as I could whether there had been any evidences of plutonic action in that region within a few years, I heard a tradition that about the holidays of 1877-'78 an earthquake shock had been felt on the west coast. I have had no opportunity, as yet, to verify this, but it is a well-known fact that just previous to the hurricane of last August, so well remembered by all the people of Florida West as a time of almost unparalleled destruction of shipping and height of tidal waves, a shock of earthquake was felt throughout the whole southwestern end of the peninsula. It did considerable damage in the city of Key West, and was so alarming at Tampa that several persons ran in a fright from their houses. Immediately after it, began the sudden destruction of fish I have described.

Whether the physical shock of such an occurrence, touching the fish and creepers on the bottom, would do them harm, or whether the subsequent patches of "poisoned water" owed their discoloration and undoubted deleterious properties to being saturated with sulphurous or carbonic-acid gases derived from subterranean vents, I cannot presume to decide. But if the last supposition had been proved true, or shall be at some future time, would it not be a rational and sufficient explanation of the death of the fishes, sponges, and their kin, whenever they came in contact with the discolored water alluded to?

Analysis of the suspected water would have done more to solve the question, probably, than anything else can do, and it is a matter of continued regret that I could not obtain specimens of it for that purpose. After the end of September, however, the evil diminished, and by Christmas all of the harmful water had disappeared from the Gulf.

Regretting that I could not have done more to get at the truth of the matter, in essaying which I was offered every aid by the citizens of Florida, but continually impeded by bad weather and other untoward circumstances, I beg to submit this little that I have learned; and I have the honor to be,

Very respectfully yours,

ERNEST INGERSOLL.

Professor SPENCER F. BAIRD,

*United States Commissioner of Fish and Fisheries,*

*Washington, D. C.*

## NOTES ON SALMONIDÆ OF THE UPPER COLUMBIA.

By CAPT. CHARLES BENDIRE, U. S. A.

[NOTE.—The United States National Museum has lately received from Captain Bendire a very fine series of fishes from the neighborhood of Fort Walla Walla, by far the most valuable collection of fishes ever made in the waters of the Upper Columbia. The series is especially valuable, as it throws much light on the life history of the Blue-back Salmon or "Red-fish" (*Oncorhynchus nerka*), and shows, apparently beyond a doubt, what no one had before suspected, so far as I know, that the supposed land-locked little red salmon (*Oncorhynchus kennerlyi*) is nothing but the young breeding male or grilse of the *Oncorhynchus nerka*. Accompanying the collection are many valuable field-notes on the different species. Those relating to the Salmon and Trout are here extracted, each paragraph being preceded by my identification of the species to which the remarks refer.—D. S. JORDAN.]

a. *Oncorhynchus nerka* (Walb.) Gill & Jor.

(Adults in spring dress; the ordinary "Blue-back" of the Lower Columbia.)

Species of Salmon, ♀ and ♂, caught in the Columbia River near Wallula, Wash., July 7, 1880. Local name, Silver Salmon. Some 250 miles farther up the Snake River the same fish (at least I have every reason to believe it to be the same fish) are called Blue-backs or Steel-backs. This is undoubtedly the same species which during the spawning stage is known as the Red-fish found in the Wallowa Lake, Oregon, and Payette and Salmon Lakes, Idaho Territory.

b. *Oncorhynchus nerka*.(Young male, exactly like the types of *Salmo kennerlyi* Suckley.)

A very interesting specimen. I take this to be a two-year old Red-fish, the only one of this size seen or caught. It was very deep for its size, and resembles, as nearly as I can recollect, the type of *Salmo kennerlyi* very much. It was caught on a hook by one of Mr. Messenger's men September 1, 1880, and is the only one of the size ever observed by any of them. Color bluish black above, silvery white on lower parts.

c. *Oncorhynchus nerka*.

(Young, not yet showing hooked jaws.)

Young Red-fish. In some back steel-blue, in others back bluish and greenish bronze; sides lilac-colored, showing almost all the colors of a rainbow; bellies silvery white; iris silvery with black centre. In life one of the handsomest little fish I have ever seen. Some specimens show spots of a bluish-black color like trout on the head and near the tail and caudal fin, a few only along the whole back. Most of these spots disappear shortly after death, but in some I noticed them some



hours after capture. These fish are all about the same size, and, strange to say, they seem to be all males,\* and the milt often flows from them while being taken from the hook, through squeezing them.

*d. Oncorhynchus nerka.*

(Adult in September; "Red-fish.")

Description and color notes taken of several specimens, just as they came out of the water, showing the differences in individuals. All were from Wallowa Lake, Oregon, caught with a seine near the head of the lake August 31 and September 1, 1880.

No. 1, ♂. Upper half of sides and back bright scarlet red, posterior parts shading off to a bright crimson; the two upper fins same color as the back, lower fins bluish on lower parts, the upper ends greenish olive; belly bluish; whole upper part of head light greenish yellow, showing in strong contrast to the body; base of upper jaw steel-blue, lower jaw bluish white.

No. 2, ♂. Upper parts claret-color, slightly brighter about the caudal region, otherwise marked like No. 1. Top of head light yellowish green, the yellow predominating, this color extending to and below the eye, and backwards to end of gills, a deep olive green darker than the upper parts of head, giving this specimen a very peculiar appearance; belly bluish white.

No. 3. Upper parts a very deep purple; lower parts of belly a deep bluish lead-color, otherwise marked like No. 2.

No. 4, ♂. Small. Presumably just arrived at the lake. In this specimen the hooked nose is not as fully developed as in the preceding ones, and the characteristic red of this species is obscured and partly hidden by a bluish tint. The hump is not yet developed on the back, and if it was not for the slightly hooked nose this specimen might readily be taken for a female. Belly silvery white beneath, slightly tinged with blue on the sides. Iris silvery.

The females are much more uniformly colored. The head is considerably tinged with steel-blue and the red tint on the sides is more or less clouded with blue and bronze. Females after spawning show considerable amount of red, only after spawning I noticed that the red coloring matter deposited in the skin appears to be drawn from the flesh, and I find that in proportion to the bright coloring of the skin of the fish the flesh loses this tint. In some instances it is barely pink-colored or almost white. After the spawning of these fish they are brightest outside and palest inside (as far as the flesh is concerned). The average size of a number of males by actual weight is only 5 pounds, and of females only  $3\frac{3}{4}$  pounds. After death within half an hour the color of these fish rapidly changes about the head and becomes a dark olive green with bluish reflections, in some instances almost bluish black.

\* One female less than a foot long was found in the lot. The eggs were well developed, though few in number.—D. S. J.



Among any number of fish there is an almost endless variation in color, caused, perhaps, by some remaining a longer time in the lake than others. Wallowa Lake is about  $4\frac{1}{4}$  miles in length by  $1\frac{1}{2}$  to 2 miles wide. It deepens very rapidly out a few feet from the shore, and is said to be 400 feet deep, and more than that in places. Two small streams flow into the lake, and these form the spawning ground proper for these fish; and as there are falls about two miles above the mouth of these streams over which the fish cannot leap, they are restricted to rather limited quarters for spawning. The only place I saw any of these fish was on the bar near the head of the lake, and there most of them are caught. They can be seen in schools of 100 or more at almost any time during the month of August and later. This year the run has been very light, and fishing had to a great extent stopped when I arrived at the lake on the last day of August. Four fisheries had been in operation, and these had put up about 20,000 pounds of fish. I believe two or three years ago it had been the practice to obstruct the entrances to the small streams at the head of the lake to prevent the fish from running up these streams. This year this was not done, and a number of the settlers about the lake seem to be anxious to have the fish properly protected, and it is not at all too soon to do it, either. The placing of obstructions in the above-mentioned streams, and perhaps this year of gill nets on the bar, has no doubt something to do with the scarcity of these fish. But the most abominable things of all which I saw personally in use are several clusters of hooks tied together, so that they form a circle with a radius of about 3 inches. Just above these hooks a lump of Red-fish eggs is laid. These are covered with mosquito-netting, and by this contrivance thousands of young Red-fish (the settlers call them "shiners," others call them "trout," but I am satisfied that it will be found that they are yearling Red-fish\*) are caught and salted as well as the full-grown ones. Now, these fish are only about 4 inches long, and for every one caught two are crippled and die. So it can readily be seen that an immense number are destroyed yearly, as some parties make it a business to salt these down as well as mature fish.

I examined all these modes of fishing, and when I hooked with a single hook about one out of three in some other part of the body than the head, it can readily be understood how murderous such a contrivance as the above must be, and how many young fish can be destroyed by a single person in a day. They bait them first, and when they become plenty use their grappling hooks.

The fishermen at the lake complain that the Indians destroy the fish, but from personal observation I can't at all agree with them. It is true that numbers of Indians come from various parts of the country to Wallowa Lake yearly to fish, and they catch a good many. While I was camped at the lake I examined the catch of every Indian that passed

\* No doubt of it.—D. S. J.

my camp, and I looked at as many as fifty Indians a day; each one had from six to twelve fish usually tied on his horse, and I found that there was about one female to ten males, and most of these were spent fish which had already spawned. They are not at all particular about this, and a fish which may be all bruised up and skinned is apparently just as well relished by them as a perfectly sound one, and even these Indians appreciated the fact that it would not do to catch too many females; at any rate they told me that as a rule they let the females go, and this is a good deal more than most of our white fishermen are willing to do. Mostly every one out here now concedes that the Red-fish is not a resident of the lakes wherein it is found, and I am perfectly satisfied that they are anadromous and not land-locked. The only thing as yet which I can't understand is, how do they get rid of the hooked nose and the hump after going back to salt water? They surely can't all die after spawning, and sometimes one that weighs as much as ten pounds is caught, and this fish is certainly older than a five-pounder; and it would not be presuming too much to assert that a Salmon of that size must have made more than one trip to sea. While in the lake they do not appear to eat anything, and the stomachs of several which I examined were entirely empty. I cannot understand how they get rid of their long hooked nose and hump.

e. *Oncorhynchus chouicha* (Walb.) Jor. & Gibb.

(Quinnat or Chinook Salmon; a young male corresponding to the "kemmerlyi" stage of the Red-fish.)

*Salmo quinnat* ♂. A very small specimen. If not a true Chinook Salmon, it was at least in company with several of this species. The back of this one was olive green, spotted like a trout, with round and also irregularly-shaped black spots; sides greenish white. It was shot with several others in Bear Creek, Oregon, September 4, 1880.

I was very sorry that I had not the means to preserve a pair of large Salmon which I had, but I had no room in the large tank, and these fish were too large to go in if I had the room. A male specimen measured 46½ inches. Back brownish black, merging into a deep olive green on the sides, spotted with well-defined black spots on back, upper part of the sides, and caudal fins; a large bright purple patch, some 8-9 inches long, 2½ to 3 wide, on the lower anal region from the ventral fin back to tail. Belly very pale olive green and whitish. The female measured 37½ inches; colored like the male, but without any trace of red whatever. These fish had not spawned as yet, September 4. The red about the anal region is much more perceptible in large specimens than in small ones. None of the females (three) showed any red on them; all the larger males did, excepting the specimen I put up. The fish were all in good condition, none bruised and skinned up, the way I have seen them on the headwaters of the Salmon River. The Indians catch but few of these Salmon, preferring the Red-fish, which, from its small size,

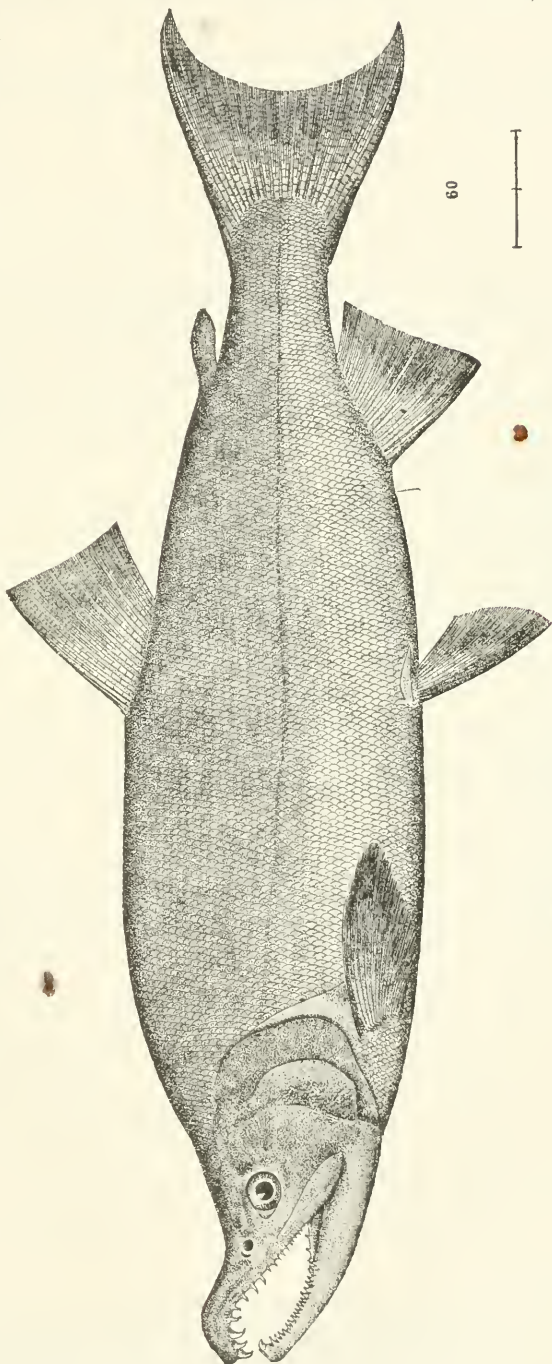
is easier cured; partly smoked and dried. Now and then, I am told, these Salmon run up the Wallowa River to the entrance of the lake, but invariably turn back again as soon as they strike the deep water. I cannot vouch for the truth of this, but every one of the fishermen claims that the principal spawning grounds of the Chinook Salmon, in the vicinity of Lake Wallowa, are near the head of the South Fork of the Wallowa River, and in Bear Creek, Oregon. But these fish arrive in smaller numbers every year, and are diminishing even more rapidly than the Red-fish.

*f. Salmo purpuratus* Pallas.

Trout called Salmon-Trout at Fort Cœur d'Alene. Belly silver white, a red stripe along the side, head and back steel-blue, with small black spots scattered over head and back. Small specimens have also a few black spots under the red stripe; these are found mostly towards the head.

*g. Salmo purpuratus* Pallas.

Called a Mountain Trout; ♂ weight 7 pounds 2 ounces, length  $24\frac{1}{2}$  inches. I opened this fish yesterday, September 18, to show him, and see that it has greatly changed. No red



Male Red-fish received from Capt. Bendire, Oct., 1879.



was visible whatever on the sides when caught. The back was bluish horn color with black crescent-shaped spots, sides and belly silvery white. Three larger specimens than this were caught in Wallowa Lake this season by Mr. Messenger; one weighing over 10 pounds. I had another one which weighed  $4\frac{1}{4}$  pounds, but had no room for it in the collecting tank, and therefore had it cooked.

*h. Salmo purpuratus* Pallas. *Var. Bouvieri* Bendire.

(A variety singularly colored, but not evidently different otherwise.)

Trout from Waha Lake, 14 miles from Fort Lapwai, Idaho Territory. This lake has no visible outlet, is about 3 miles long by  $1\frac{1}{2}$  miles wide, and is situated on the northern slope of Craig's Mountain. I frequently fished in this lake in the years 1869 and 1870, when stationed at Fort Lapwai, Idaho Territory, and never heard of any other kind of fish being found in said lake. All the fish caught there are about the same size, from 6 to 10 inches long. I believe it is a new species or variety, as no similar looking Trout are found in the streams or lakes in the neighborhood.

Back bluish green, olive color, sides silvery; in some instances the whole belly is red, in others the sides only; a few show a yellowish tinge; no red on the sides. There are round black spots near the tail, and fainter ones on the flanks. A few have an occasional spot on the head; two vermilion-colored stripes on each side of the under jaw; fins edged with brick red, ranging from this color to an orange.

Caught August 21, 1880.

This lake is very deep, and the water clear and cold. A smaller lake situated only some 400 yards from Lake Waha, and of somewhat lower altitude, contains no fish whatever.

*i. Salvelinus malma* (Walb.) Jor. & Gilb.

Bull Trout, Cœur d'Alene Lake, August 5. The Bull Trout with one exception were caught by Drum Major Sattors, Second United States Infantry, and I am indebted to Capt. William Mills and First Lieut. John K. Waring, Second Infantry, for several fine specimens of Trout and use of their boats.

According to the general testimony of all the officers, at the time I was at the lake, the fishing there was very poor, at least as far as size is concerned, the largest specimen not weighing over  $2\frac{1}{2}$  or 3 pounds, but it seemed to me that fish weighing one pound and upwards were very plenty. The lake, no doubt, contains some large fish, particularly among the Bull Trout, of which specimens have been caught weighing 10 pounds and over. These were, at the time of my visit, very scarce, and were supposed to have gone up some of the numerous streams to spawn.

The Bull Trout seems to bear his name all over this section of country, while for the others there are numerous names, no two parties agreeing.

The more I see of these Trout, the less hopeful I become of adding

new species among this family, and I do not believe that over four\* different kinds are to be found in this upper country.

*j. Salvelinus malma.*

Bull Trout, Cœur d'Alene Lake, August 5. Belly silver white; back and upper parts grayish, spotted with round pink markings; head darker than the back, which seems to be bluish black.

**A REVIEW OF THE GENERA AND SPECIES OF THE FAMILY CENTRARCHIDÆ, WITH A DESCRIPTION OF ONE NEW SPECIES.**

**By CHARLES L. MCKAY.**

The object of this paper is to give a catalogue of the genera and species of Centrarchidæ recognized by me, in anticipation of a monographic review of the family which I hope to publish at some future time. The results here obtained are based on a study of all the specimens of Centrarchidæ in the United States National Museum and in the collection of Professor Jordan. Types of nearly all the nominal species thus far described have been examined and compared, and I believe that very few of those here mentioned will prove invalid. The species not examined by me are designated by a star (\*).

1. Genus CENTRARCHUS C. & V.

1. *Centrarchus macropterus* (Lac.) Jor. = *C. irideus* C. & V.

The characters assumed to distinguish *C. macropterus* and *C. irideus* disappear on examination of a large series.

2. Genus POMOXYS Rafinesque.

2. *Pomoxys sparoides* (Lac.) Girard. = *Centrarchus hexacanthus* Cuv. & Val.

3. *Pomoxys annularis* Raf.

3. Genus ARCHOPLITES Gill.

4. *Archoplites interruptus* (Grd.) Gill.

4. Genus AMBLOPLITES Rafinesque.

5. *Ambloplites rupestris* (Raf.) Gill. = ? *A. cavifrons* Cope.

5. Genus ACANTHARCHUS Gill.

6. *Acantharchus pomotis* (Baird) Gill.

\* *Oncorhynchus chonicha*; *O. nerka*; *Salmo purpuratus*; *Salvelinus malma*. *Salmo irideus* does not range so far to the northward, and *Salmo gairdneri* and the three other species of *Oncorhynchus* (*keta kisutch*, *gorbuscha*), do not ascend so far from the sea.—D. S. J.



## 6. Genus CHÆNOBRYTTUS Gill.

7. *Chænobryttus gulosus* (C. & V.) Jor. = *Centrarchus viridis* C. & V. ; *Chænobryttus viridis* Jor. ; *Lepomis gilli* Cope ; *Calliurus floridensis* Holbr.

8. *Chænobryttus antistius* McKay, nom. sp. nov. = *Glossoplites melanoops* Jor. Man Vert. ed. i, p. 317, and *Chænobryttus gulosus* Jor., Ann. Lye. Nat. Hist. 1876.

This species is best distinguished from the preceding by the position of the dorsal, the first spine being situated over the posterior margin of the opercular lobe, while in *C. gulosus* the first spine is situated directly over the posterior portion of the base of the pectorals. The only specimens of this species known to me are in the collection of Professor Jordan. The types are from Lake Michigan. There are smaller specimens in the collection from the Upper Wabash and the Illinois Rivers. I have examined specimens of *C. gulosus*, which is a southern form, in the National Museum, from each of the Southern States, from Texas to Virginia.

## 7. Genus LEPOMIS Rafinesque.

This genus, as understood by me, includes *Apomotis*, *Xenotis*, *Bryttus*, *Helioperca*, *Xystroplites*, and *Eupomotis* of authors. *Apomotis* has been separated from *Lepomis* on account of the large size of the supplemental maxillary. On careful comparison this is found to be scarcely larger than in one or two other species of *Lepomis*. It disappears by degrees, but seems to exist in all the species, though sometimes so small as to be inappreciable. I have even found it present in large specimens of *L. pallidus*. Its presence in the species is only a character of degree, therefore not generic. Till the group had been more fully studied, *Xenotis* was supposed to contain a large number of species, and was separated from *Lepomis* principally for convenience' sake, and on the slight character of the feeble gill-rakers. By the comparison of a very large series of the alleged species from Professor Jordan's collection I have come to the conclusion that they are all forms of a single species. The gill-rakers are usually rather more feeble than in the rest of the species of *Lepomis*, but this again is a question of degree. *Bryttus* has been distinguished from *Lepomis* by the presence of palatine teeth. This is also a character of degree, and is subject to the most perfect gradation. I have found it impossible to retain *Xystroplites* and *Eupomotis* also, as there is complete gradation in the character of the pharyngeals between *Lepomis* proper and *Xystroplites*, and again between *Xystroplites* and *Eupomotis* both as to the width and form of the bones themselves and the form of the teeth.

9. *Lepomis cyanellus* Raf.

10. *Lepomis symmetricus* \* Forbes, MSS. (in Jordan & Gilbert's Synopsis Fishes N. A. ined.).

11. *Lepomis phenax* (Cope & Jor.) McKay.

12. *Lepomis murinus* (Grd.) McKay.

Some of the types of *Calliurus murinus* Grd. belong to *L. cyanellus*, but the specimen figured by him in the U. S. P. R. R. Exp., x, pl. vii, Fig.

1, belongs to a different species, apparently distinct from all others known. Type B. & G. No. 415, U. S. Nat. Mus.

13. *Lepomis lirus* \* McKay, nom. sp. nov. = *Pomotis pallidus* Ag. Not *Labras pallidus* Mitch. Not *Eupomotis pallidus* Jor. which is *Lepomus notatus*. According to Professor Bliss (in letter to Professor Jordan), the pharyngeal teeth of this species are paved.

14. *Lepomis ischyurus* Jordan & Nelson.

15. *Lepomis macrochirus* Raf.

16. *Lepomis punctatus* (C. & V.) Jor. = *L. apiatulus* Cope.

17. *Lepomis miniatus* Jordan.

18. *Lepomis humilis* (Grd.) Cope. = *L. anagallinus* Cope. Type No. 430, U. S. Nat. Mus. From Brazos R., Tex.

19. *Lepomis auritus* (L.) Raf.

19. a *Lepomis auritus* var. *solis* (C. & V.) McKay = *Lepomis rubricauda* Holbr.

The variety is the southern form, and is distinguished from the northern by having larger scales on the cheeks (usually 7 rows instead of 8) and in front of the pectorals, and usually a dark blotch on posterior margin of dorsal.

20. *Lepomis megalotis* (Raf.) Cope. = *Pomotis inscriptus* Ag. ; *Lepomis peltastes* Cope. ; *Xenotis aurcolus* Jor. ; *Xenotis solis* Gill & Jor. ; *Xenotis lythrochloris* Jor. ; *Ichthelis auritus* Raf. ; *Pomotis sanguinolentus* Ag. ; *Pomotis nitidus* Kirtland ; *Pomotis popeii* Grd. ; *Pomotis fallax* B. & G. ; *Pomotis breviceps* B. & G.

21. *Lepomis marginatus* \* (Holbr.) McKay.

22. *Lepomis elongatus* \* (Holbr.) Gill & Jor.

23. *Lepomis pallidus* (Mitch.) Gill & Jor. = *Lepomis obscurus* (Ag.) Jor.

24. *Lepomis bombifrons* \* (Ag.) Jor.

25. *Lepomis heros* (B. & G.) McKay = *Xystroplites heros*, Jor.

26. *Lepomis albulus* (Grd.) McKay.

The types of this species have been recently found and are identical with *Xystroplites gilli* Jor. Type No. 421, U. S. Nat. Mus. Rio Blanco, Tex.

27. *Lepomis euryurus* McKay. Sp. nov.

Body very robust, compressed. Form nearly oval; dorsal outline more convex than ventral. Antedorsal outline rather steep, slightly convex. Profile slightly depressed above eye. Mouth quite oblique, rather small; maxillary reaching to front margin of eye. Outer row of teeth on both jaws much stronger than the others. Teeth on vomer and front portion of palatines. Lower pharyngeals with the rather long posterior spur turned up; stoutish, the inner angle rounded, somewhat obtuse. Teeth stout, very much blunted, not close set; the inner considerably stronger and less blunt than the rest. The characters of the pharyngeals are those ascribed by Professor Jordan to the genus *Xystroplites*. Gill-rakers short, stout, nearly terete, about eight in number,

the inner surface roughened, scarcely dentate. Branchiostegals six. Maxillary with a small but perfectly distinct supplemental bone. Eye very small, considerably less than length of snout (perhaps an individual character). Nostrils in line with pupil. Preorbital quadrate, mostly below line of pupil; preoperculum moderately large, lower angle rounded, very slightly obtuse. Scales on cheeks moderate, in six to seven rows. Opercle rather large, triangular, with the posterior angle produced into a rounded bony flap, nearly equaling the snout in length. The flap is of a shiny black color as in *L. cyanellus*, surrounded by a very broad membranous margin, which is white in the alcoholic specimen. Scales on the opercle large, in five rows. Suboperculum of nearly the same width throughout, with a single row of scales. Interoperculum wider than suboperculum, with about a row and a half of scales. Scales continued upwards a short distance between opercle and preopercle. Spine of the premaxillary stout and broad; width at base equal to one-third of interorbital space, moderately long, reaching to posterior nostril. Mucous channel from eye to suprascapular bone extremely narrow, scarcely separating the scales. Scales moderately large, ctenoid. Dorsal beginning over base of pectorals. Dorsal and anal somewhat obliquely opposed. Spinous portion of dorsal fin low, the longest spine reaching very little past margin of eye. Spines not very stout, nearly straight; all but the first two of nearly the same height. Soft portion of dorsal much higher than spinous, reaching greatest height at seventh and eighth rays, behind which it descends abruptly. Both caudal peduncle and fin short and stout. Soft portion of anal rounded. Insertion of ventrals behind base of pectorals, not reaching beyond vent. Pectorals short, only reaching vent. Scales in front of pectorals not much reduced, considerably larger than those on cheeks. The description of the species is taken from a single specimen, No. 4109, in the United States National Museum, from Fort Gratiot, Michigan, at the foot of Lake Huron.

*Table of Measurements.*

Species: *Lepomis euryurus*.

Current number of specimen .....	4109.	
Locality .....	Fort Gratiot, Michigan.	
Dimensions.	Inches and 100ths.	100ths of length.
Extreme length.....	6 $\frac{64}{100}$	.....
Body:		
Greatest height.....	.....	43
Greatest width.....	.....	16 $\frac{1}{2}$
Least height of tail.....	.....	13 $\frac{1}{2}$
Length of caudal peduncle.....	.....	13 $\frac{1}{2}$
Head:		
Greatest length without ear-flap.....	.....	27 $\frac{1}{2}$
Distance from snout to nape.....	.....	13
Greatest width.....	.....	16
Width of interorbital area.....	.....	10 $\frac{1}{2}$
Length of snout.....	.....	9
Length of ear-flap.....	.....	8
Length of maxillary.....	.....	12

Table of measurements—Continued.

Dimensions.	Inches and 100ths.	100ths of length.
Head :		
Length of mandible .....		12 $\frac{3}{4}$
Diameter of orbit .....		6
Dorsal (spinous):		
Distance from snout .....		36
Length of base .....		26
Greatest height at fifth spine .....		9 $\frac{1}{2}$
Height at first spine .....		3 $\frac{1}{2}$
Dorsal (soft):		
Length of base .....		17 $\frac{3}{4}$
Height at antecedent spine .....		8 $\frac{3}{4}$
Height at longest ray (the seventh) .....		17
Anal:		
Distance from snout .....		57
Length of base .....		20
Height at first spine .....		4 $\frac{1}{2}$
Height at third spine .....		10
Height at longest ray (the fifth) .....		14 $\frac{1}{2}$
Caudal:		
Length of external rays .....		16
Pectoral:		
Distance from snout .....		31
Length .....		20 $\frac{1}{2}$
Ventral:		
Distance from snout .....		38 $\frac{1}{2}$
Length .....		17
Braichistegals .....		6
Dorsal .....	X, 11	
Anal .....	III, 10	
Number of scales in lateral line .....		43
Number of transverse rows above lateral line .....		6
Number of transverse rows below lateral line .....	14-15	

28. *Lepomis gibbosus* (L.) McKay.

In the little-known eleventh or Halle edition of the *Systema Naturæ* of Linnaeus, occur the following descriptions :

“*Labrus auritus*. L. cauda bifida, operculis branchiarum pinniformibus. D.  $\frac{10}{1}$ . P. 15. V. 6. A. 13. C. 17. *Habitat in Philadelphia. Mus. De Geer.*” (p. 283.)

“*Perca gibbosa*. P. pinnis dorsalibus unitis, cauda bifida, abdomine luteo, operculo striatis, apice nigro fulvoque. *Catesb. car.* 2. p. 8. t. 8. f. 3. *Perca fluviatilis gibbosa*, ventre luteo. *Habitat in America.*” (p. 293.)

The description of *Perca gibbosa* refers of course to *Eupomotis aurea*, of authors, and the specific name of *gibbosus* must supersede *aureus* Walbaum 1792. In his twelfth edition Linnaeus suppressed his *Perca gibbosa*, and referred Catesby's figure of *Perca fluviatilis gibbosa* with doubt, to the *Labrus auritus*. The description in the twelfth edition, as Professor Gill has shown, can refer only to *L. auritus*. The specific



name, *gibbosus*, therefore, should be applied to *Eupomotis aureus* of authors, and *auritus* to the northern form of the other species.

29. *Lepomis holbrooki* (C. & V.) McKay = *Pomotis speciosus* Holbr.

30. *Lepomis notatus* (Ag.) McKay = *Eupomotis pallidus* Gill & Jordan.

Professor Jordan has received from the Museum of Comparative Zoölogy some of Agassiz's types of *Pomotis notatus*, which species proves on examination to be identical with *Eupomotis pallidus*, Gill & Jordan.

#### 8. Genus MESOGONISTIUS Gill.

31. *Mesogonistius chaetodon* (Baird) Gill.

#### 9. Genus ENNEACANTHUS Gill.

This genus, as understood by me, includes *Hemioplites* and *Copelandia*. The genus *Hemioplites* was based by Cope on the presence of eight spines in the dorsal fin and four in the anal. I learn from Professor Jordan's notes that Cope's original type of *Hemioplites simulans* has really nine spines in the dorsal. Dr. Edward J. Nolan, who has recently examined the specimen, also informs me that there are nine spines in the dorsal. In a collection of young specimens of *Enneacanthus margarotis* from Virginia, which I have examined in the National Museum, there were several specimens with the fin formula D. 9, A. 4, several with the formula D. 10, A. 4, and the remainder with the formula D. 9, A. 3. That is, some of these specimens, all collected at the same time, and evidently of the same species, were *Enneacanthus margarotis*, others were *Hemioplites simulans*, and the remainder would represent a second species of *Copelandia*.

In 120 specimens of *Enneacanthus margarotis* examined by me, the results were as follows:

13 specimens with D. 8, A. 3.

89 specimens with D. 9, A. 3.

9 specimens with D. 10, A. 3.

5 specimens with D. 10, A. 4.

4 specimens with D. 9, A. 4.

In the examination of 53 specimens of *Enneacanthus obesus* the following results were obtained:

4 specimens with D. 8, A. 3.

46 specimens with D. 9, A. 3.

2 specimens with D. 10, A. 3.

1 specimen with D. 10, A. 4.

In view of these facts, I include *Hemioplites* and *Copelandia* under *Enneacanthus*.

32. *Enneacanthus simulans* (Cope) McKay = *Enneacanthus margarotis* Gill & Jor.; *Hemioplites simulans* Cope; *Enneacanthus pinniger* Gill & Jor.

Having examined the types of *Enneacanthus pinniger*, and compared them with large-finned males of *Enneacanthus margarotis*, I am unable



to find specific differences. They are probably specimens which have developed under more favorable circumstances than are usually accorded to the species.

- 33. *Enneacanthus obesus* (Grl.) Gill.
- 34. *Enneacanthus gloriosus* \* (Holbr.) Jor.
- 35. *Enneacanthus eriarchus* (Jor.) McKay,

# 10. Genus MICROPTERUS Lacépède.

- 36. *Micropterus salmoides* (Lac.) Henshall in "Book of the Black Bass" (advance sheets) = *Micropterus pallidus* Gill & Jor.
- 37. *Micropterus dolomieu* Lacépède = *Micropterus salmoides* Gill.

INDIANA UNIVERSITY,

Bloomington, Ind., March 10, 1881.

## A REVIEW OF THE GENUS CENTURUS, SWAINSON.

By ROBERT RIDGWAY.

### INTRODUCTION.

The collection of the United States National Museum contains examples of all the known species of the genus *Centurus*, excepting *C. hypopolius* (Wagl.), *C. rubriventris* Swains., and *C. terricolor* Berlepsch, the two latter being of some what doubtful status. More or less confusion has hitherto existed regarding the nomenclature of several of the Middle American forms, and it was the desire to clear away as much of this confusion as possible that prompted the investigations upon which this review is based, and which have led to the discovery of relationships which were before quite unsuspected, at least by the writer.

Of the fourteen forms treated of in this paper as sufficiently distinct for definition, not more than six, or less than one-half, can be said to be perfectly isolated, or to possess the requirements of perfectly distinct species; at least the abundant material which has been examined in this connection proves beyond question the intergradation of four so-called species, while it suggests more or less strongly the probability or possibility of such relationship with regard to five of the remaining ten. Those which appear to be unquestionably distinct are the three West Indian species, *C. radiolatus* (Wagl.), *C. superciliaris* (Temm.), and *C. striatus* (Müll.), and three continental species, *C. uropygialis*, Baird, *C. hypopolius* (Wagl.), and *C. elegans* (Swains.). Those which certainly intergrade, and are therefore to be united under one specific designation, are *C. aurifrons* (Wagl.), *C. santacruzi* Bp., *C. dubius* (Cabot), and *C. hoffmanni*, Caban, all of which are, however, strongly characterized geographical races or sub-species. The five forms of doubtful relationship are (1) *C. carolinus* (Linn.), which may possibly grade into *C. rubriventris*, but which is probably distinct; (2) *C. rubriventris* (Sw.), with which I

am not autoptically acquainted, but which appears to be a northern form of *C. tricolor*, or, possibly, a local race of *C. aurifrons dubius*; (3) *C. tricolor* (Wagl.), which in some specimens so closely approaches *C. aurifrons hoffmanni* that it is often difficult to decide to which a given specimen should be referred; and (4) *C. terricolor*, Berlepsch, which is possibly a local race of *C. tricolor*. In the following synopsis, I have subordinated as sub-species only those forms which are known with certainty to intergrade, all of which belong to *C. aurifrons*. Those of doubtful relationship are treated as species, since it seems best to accord them that rank until it can be proven they are not entitled to it. Two more or less apocryphal species referred by Malherbe (*Monographie des Piciidées*, ii, 1862) to this genus, *Picus gerini*, Temm. and *P. aurocapillus*, Vig., are not included in the synoptical table, but a transcription of Malherbe's account of these supposed species is given at the end of this paper.

## LITERATURE.

The genus *Centurus* has received special attention, so far as I have been able to discover, from but three authorities, viz, Malherbe, Cabanis, and Sundevall, whose arrangements of the species, with the equivalent names of the present synopsis, are given below in chronological order. Also, as showing the latest arrangement, the names adopted in Selater and Salvin's *Nomenclator Avium Neotropicalium*.

## (1.) MALHERBE (1862).

*Monographie des Piciidées*, etc., etc., par Alf. Malherbe. 4 vols. folio. Metz: 1861-2.

[The genus "*Zebrapicus*" (= *Centurus*) is treated in vol. ii (text), pp. 223-250, and vol. iv (plates), pl. —.]

- |  |                                     |
|--|-------------------------------------|
| 1. <i>Zebrapicus superciliaris</i> , p. 223, pl. 102, figs. 1, 2, and 4. | = <i>C. superciliaris</i> .         |
| 2. " <i>elegans</i> , p. 225, pl. 102, figs. 5, 6.                       | = <i>C. elegans</i> .               |
| 3. " <i>pucherani</i> , p. 227, pl. 103, figs. 1, 2.                     | (= <i>Melanerpes pucherani</i> .)   |
| 4. " <i>hypopolius</i> , p. 228, pl. 103, figs. 4, 5.                    | = <i>C. hypopolius</i> .            |
| 5. " <i>gerinii</i> , p. 231.  | (= <i>Melanerpes pucherani</i> ?)   |
| 5. " <i>striatus</i> , p. 231, pl. 107, figs. 2, 3.                      | = <i>C. striatus</i> .              |
| 6. " <i>carolinus</i> , p. 234, pl. 103, figs. 7, 8.                     | = <i>C. carolinus</i> .             |
| 7. " <i>radiolatus</i> , p. 237, pl. 104, figs. 5, 6.                    | = <i>C. radiolatus</i> .            |
| 8. " <i>aurifrons</i> , p. 240, pl. 104, figs. 1, 2, 3.                  | = <i>C. aurifrons</i> .             |
| 9. " <i>santa-cruzi</i> , p. 241, pl. 105, figs. 4, 5.                   | = <i>C. aurifrons santa-cruzi</i> . |
| 10. " <i>erythrophthalmus</i> , p. 243, pl. 105, figs. 1, 2.             | = <i>C. aurifrons dubius</i> .      |
| 11. " <i>kaupii</i> , p. 245, pl. 106, figs. 4, 5.                       | = <i>C. uropygialis</i> .           |
| 12. " <i>tricolor</i> , p. 247, pl. 106, figs. 1, 2.                     | = <i>C. tricolor</i> .              |
| 13. " <i>rubriventris</i> , p. 248, pl. 107, fig. 1.                     | = <i>C. rubriventris</i> .          |
| 14. " <i>aurocapillus</i> , p. 250.                                      | (Unidentified.)                     |

## (2.) CABANIS (1862).

Übersicht der im Berliner Museum befindlichen Vögel von Costa Rica. <Jour. für Orn. Heft v, x. Jahrgang, September, 1862, pp. 321-336. [A synopsis of the species of *Centurus*, with synonymy and critical remarks, is given on pp. 322-330.]

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|----------------------------------|--|
| 1. <i>C. aurifrons</i> , p. 323. | = <i>C. aurifrons</i> , as restricted.                             |
| 2. <i>C. carolinus</i> , p. 324. | = <i>C. carolinus</i> .  |
| 3. <i>C. albifrons</i> , p. 324. | = <i>C. aurifrons santa-cruzi</i> and <i>C. aurifrons dubius</i> . |

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|---|--|
| 4. <i>C. polygrammus</i> , n. sp. p. 326.     | = <i>C. aurifrons santacruzii</i> (the south Mexican form tending toward <i>hoffmanni</i> ). |
| 5. <i>C. Hoffmanni</i> , n. sp. pp. 322, 327. | = <i>C. aurifrons hoffmanni</i> .  |
| 6. <i>C. elegans</i> , p. 327.                | = <i>C. elegans</i> .  |
| 7. <i>C. tricolor</i> , p. 327.               | = <i>C. tricolor</i> and <i>C. rubricentris</i>  |
| 8. <i>C. Pucherani</i> , p. 328.              | (= <i>Melanerpes pucherani</i> .)  |
| 9. <i>C. hypopolius</i> , p. 329.             | = <i>C. hypopolius</i> .   |
| 10. <i>C. uropygialis</i> , p. 330.           | = <i>C. uropygialis</i> .  |

(3.) SUNDEVALL (1866).

Conspectus Avium Picinarum, edidit Carolus J. Sundevall, Custos Musei Zool. Stockholmensis. Stockholmie: 1866. 1 vol. 8vo. pp. i-xiv. 1-116. [The species of *Centurus* are referred to the genus *Picus*, under which they are ranged as a "Tribus 15. *Pici albofusciati*," on pages 52-56.]

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|--|--|
| 150. <i>Picus striatus</i> Gm. (p. 52).    | = <i>C. striatus</i> .                 |
| 151. " <i>radiolatus</i> Wagl. (p. 52).    | = <i>C. radiolatus</i> .               |
| 152. " <i>albifrons</i> Swains. (p. 52).   | = <i>C. aurifrons dubius</i> .         |
| 153. " <i>aurifrons</i> Licht. (p. 53).    | = <i>C. aurifrons</i> (as restricted). |
| 154. " <i>polygrammus</i> Cabanis (p. 53). | = <i>C. aurifrons santacruzii</i> .    |
| 155. " <i>carolinus</i> L. (p. 53).        | = <i>C. carolinus</i> .                |
| 156. " <i>uropygialis</i> Baird (p. 54).   | = <i>C. uropygialis</i> .              |
| 157. " <i>hoffmanni</i> Cabanis (p. 54).   | = <i>C. aurifrons hoffmanni</i> .      |
| 158. " <i>tricolor</i> Wagl. (p. 54).      | = <i>C. tricolor</i> .                 |
| 159. " <i>hypopolius</i> Wagl. (p. 55).    | = <i>C. hypopolius</i> .               |
| 160. " <i>elegans</i> Swains. (p. 55).     | = <i>C. elegans</i> .                  |
| 161. " <i>superciliaris</i> Temm. (p. 55). | = <i>C. superciliaris</i> .            |
| 162. " <i>gerini</i> Temm. (p. 55).        | (= <i>Melanerpes pucherani</i> .)      |

(4.) SCLATER & SALVIN (1873).

Nomenclator Avium Neotropicalium, etc., etc. auctoribus Philippo Lutley Sclater, A. M., Phil. Doct., etc., etc. et Osberto Salvin, A. M., etc. Londoni: Sumptibus Auctorum. 1873.

- |  |  |
|--|--|
| 1. <i>striatus</i> (Bodd.) ex ins. Hayti.                      | = <i>C. striatus</i> .   |
| 2. <i>radiolatus</i> (Wagl.) ex ins. Jamaica.                  | = <i>C. radiolatus</i> .   |
| 3. <i>albifrons</i> (Sw.) ex Mex. et Guatemala.                | = <i>C. aurifrons santacruzii</i> and <i>C. aurifrons dubius</i> . |
| 4. <i>aurifrons</i> (Wagl.) ex Mex. bor.                       | = <i>C. aurifrons</i> (as restricted).                             |
| 5. <i>tricolor</i> (Wagl.) ex Columb. Venezuela et Veragna.    | = <i>C. tricolor</i> .   |
| 6. <i>hoffmanni</i> , Cab. ex Costarica.                       | = <i>C. aurifrons hoffmanni</i> .                                  |
| 7. <i>hypopolius</i> (Wagl.) ex Mexico.                        | = <i>C. hypopolius</i> .   |
| 8. <i>elegans</i> (Sw.) ex Mexico.                             | = <i>C. elegans</i> .  |
| 9. <i>superciliaris</i> (Temm.) ex ins. Cuba.                  | = <i>C. superciliaris</i> .  |
| 10. <i>pucherani</i> (Malh.) ex Mex. Am. centr. et Æquat. occ. | (= <i>Melanerpes pucherani</i> .)                                  |

Genus CENTURUS, Swainson.

*Centurus*, SWAINS. Classif. B. ii, 1837, 310 (type, *Picus carolinus*, Linn.).—BAIRD, B. N. Am., 1858, 108.—B. B. & R., Hist. N. Am. B. ii. 1874, 553.—COUES, Key, 1872, 196.

*Zebrapicus*, MALHERBE, Mem. Ac. Metz, 1849, 360: Nonv. Class. Pic., 1850, —; Mon. Pic. ii, 1862, 223 (type, *Picus carolinus* Linn.).

CH.—Bill about as long as the head, or a little longer, the length from the tip to the nostril about equal to the tarsus, or a little greater; decidedly compressed anteriorly, but depressed at the extreme base; the

lateral groove distinct for half the length of the bill; culmen decidedly but gently curved from the base; gonys nearly straight, and about half as long as the culmen. Nostrils broad, elliptical, situated about midway between the culmen and tomium, and only partly concealed by the frontal tufts. Anterior outer toe a little longer than the posterior, the inner anterior toe decidedly shorter, and the inner hind toe only about half its length. Wings long and broad, third to fifth primaries longest, the first equal to the sixth to the ninth. Tail about two-thirds as long as the wing, graduated, the feathers (except the outer) rather abruptly attenuated at ends. Colors, banded with black and white, or yellow, above, with more or less of the pileum scarlet in the male; below plain, the abdomen tinged with red, orange, or yellow in most species.

The so-called genus *Centurus* is scarcely more than an artificial division of *Melanerpes*, distinguished from the typical section of that genus chiefly, if not only, by a different system of coloration, which characterizes most of the species. Even in this respect, however, the intergradation of the two sections is so complete that certain species (notably *Zebrapicus pucherani* of Malherbe) may, with almost equal propriety, be referred to either group. The species referred to has usually been included in *Centurus*; but after careful consideration of the question, I have concluded to place it in *Melanerpes*, as being more closely related to certain species of that group than to any of the species of *Centurus* as here restricted. Its nearest allies are undoubtedly the *Melanerpes chrysauchen* of Salvin, which it resembles very closely, and "*Picus*" (= *Melanerpes*) *flavifrons* of Vieillot, and it may well be placed with them, while if allowed to remain in *Centurus* its position would be that of an isolated or aberrant species.

Following is a list of the forms recognized in this review, with the number of specimens of each which have been examined in connection with the preparation of this paper:

	Species.	U. S. Nat. Mus.	Mus. Salv. Godm.	Mus. G. N. Lawrence.	Mus. H. W. Henshaw.	Mus. S. Cabot.	Mus. J. Ridgway.	Total of each species.
1.	C. carolinus .....	41	.	.	7	.	11	59
	" tricolor .....	7	7	6	.	.	1	21
3 (?)	" rubriventris.....	.	.	.	.	.	.	0
4 (?).	" terricolor .....	.	.	.	.	.	.	0
5.	" aurifrons .....	20	8	3	.	.	.	25
5. a	" santacruzii .....	17	6	6	.	.	.	29
5. b	" hoffmanni .....	4	2	2	.	.	.	8
5. c	" dubius .....	1	2	4	.	1	.	8
6.	" radiolatus .....	5	2	3	.	.	.	10
7.	" uropygialis .....	27	.	1	4	.	.	32
8.	" hypopolius .....	.	2	.	.	.	.	2
9.	" elegans .....	10	2	4	.	.	.	16
10.	" superciliaris.....	8	2	3	.	.	.	13
11.	" striatus .....	2	1	1	.	.	.	4
Total number of specimens examined .....								227



## SYNOPSIS OF THE SPECIES OF CENTURUS.

## A.—No red on the rump.

## a. Without black about the head.

(Rump and upper tail-coverts white, immaculate, or only slightly varied with black.)

1. *C. CAROLINUS*. ♂: Entire pileum and nape scarlet, paler on the forehead; abdomen tinged with pinkish red; inner webs of middle tail-feathers varied with white. ♀: Similar, but crown ash-gray, the red of the head confined to the forehead, occiput, and nape. Wing, 5.00–5.50; culmen, 1.00–1.20. *Hab.*—Eastern United States.
2. *C. TRICOLOR*. ♂: Crown, occiput, and nape, deep scarlet, sometimes interrupted across the occiput; forehead dingy yellowish white, abdomen deep scarlet; both webs of middle tail-feathers broadly barred or transversely spotted with white; upper tail-coverts immaculate white, or scantily barred, lower with dusky V-shaped markings. ♀: Pileum light drab, growing whitish anteriorly; otherwise like the ♂. Wing, 4.05–4.55; culmen, 0.75–1.10. *Hab.*—Trinidad and Venezuela to Yragua.
- [3. ? *C. RUBRIVENTRIS*. ♂: Similar to *tricolor*, but frontlet, cheeks, and chin bright yellow, separated from the scarlet of the crown by a white frontal band; white bars of back, etc., very much narrower than in *tricolor*; middle tail-feathers without white markings, except toward base of outer webs. Wing, 4.75; culmen, 0.80. *Hab.*—Yucatan.
- [4. ? *C. TERRICOLOR*. Similar to *tricolor*, but larger, the bill longer and broader; the lower parts darker olive-brown, the abdomen darker red, and the upper and lower tail-coverts regularly barred with black. *Hab.*—“Orinoco district or Trinidad.”]
5. *C. AURIFRONS*. ♂: Crown deep scarlet; nape scarlet, orange, or yellow, coalesced with the scarlet of the crown or separated from it by an occipital band of grayish or olivaceous; frontlet yellow, orange, or red, separated from the red of the crown by a whitish frontal band; abdomen tinged with yellow, orange, or red; markings of the tail-feathers and coverts exceedingly variable. ♀: Differing in the color of the crown, which is entirely grayish, instead of red. Size exceedingly variable. *Hab.*—Middle America.
  - α. *aurifrons*. Red crown-patch usually isolated; frontlet and abdomen usually yolk-yellow; breast, etc., pale dingy ash, or dull grayish white; tibiae and crissum with broad V-shaped marks of black; inner webs of middle tail-feathers usually solid black; white bars of upper parts broad, nearly or quite as wide as the black ones. Wing, 5.20–5.65; culmen, 1.20–1.40. *Hab.*—Table-lands of Mexico, north to Southern Texas
  - β. *santacruzii*. Red crown-patch usually confluent with the orange-red of the nape; frontlet and abdomen saffron-orange; breast, etc., olive-drab, or deep smoky gray; tibiae and crissum thickly barred with blackish on a dingy yellowish ground; inner webs of middle tail-feathers usually marked, more or less, with white; white bars of upper parts much narrower than the black ones. Wing, 5.00–5.75; culmen, .95–1.25. *Hab.*—Southern Mexico, Honduras, and Guatemala.
  - γ. *dubius*. Crown, occiput, and nape intense scarlet, without any shade of orange; frontlet scarlet, separated from the red of the crown by a band of nearly pure white; abdomen, intense scarlet or almost carmine-red; inner webs of middle tail-feathers usually solid black; white bars of upper parts very much narrower than the black ones; tibiae and crissum densely barred with blackish. Wing, 4.95–5.40; culmen, 1.00–1.30. *Hab.*—Yucatan.
  - δ. *hoffmanni*. Red of crown usually isolated, as in *aurifrons*; frontlet, pale dull yellowish; lower parts dark colored, with the abdomen saffron yellow as in *santacruzii*; flanks, etc., coarsely barred, as in *aurifrons*, and white bars of upper parts broad, as in that race; inner webs of middle tail-feathers edged with



white and deeply indented with broad spots of the same, the outer webs with a longitudinal stripe of white. Wing, 4.60-4.75; culmen, .90-1.05. *Hab.*—Costa Rica.

(*Rump and upper tail-coverts black, narrowly barred with white.*)

6. *C. RADIIOLATUS*. ♂ : Pileum and nape bright scarlet-erimson; remainder of the head, including a frontal band, soiled white (sometimes pure white on the forehead), changing quite abruptly on the jugulum, breast, etc.; abdomen, deeply tinged with saffron-red, upper parts black with narrow thread-like bars of white; crissum, etc., black, narrowly barred with white. ♀ : Similar, but crown and occiput smoky gray, lighter anteriorly. Wing, 5.00-5.40; culmen, 1.30-1.45. *Hab.*—Jamaica.

(*Rump and upper tail-coverts white, regularly barred with black.*)

7. *C. UROPYGIALIS*. Head, neck, and lower parts rather light smoky drab, usually deepest on the nape; paler on the forehead, and tinged with yellow on the abdomen; upper parts, *including rump and upper tail-coverts*, broadly barred with black and white; inner webs of middle tail-feathers white, broadly barred with black. ♂ : Crown with a central patch of scarlet-erimson. ♀ : Without any red on the crown. Wing, 5.00-5.30; culmen, .95-1.25. *Hab.*—Northwestern Mexico and contiguous portions of Southwestern United States.

b. With black markings about the head.

8. *C. HYPOPOLIUS*. ♂ : Head, neck, and lower parts deep smoky gray, or purplish drab, darkest on head above and nape, lightest on forehead, chin, and throat; orbits surrounded by a blue-black circlelet, interrupted posteriorly by white on the upper eyelid; centre of crown with a patch of crimson, and lower part of auriculars touched with the same; upper parts broadly barred with glossy black and brownish white; inner webs of middle tail-feathers varied with white. ♀ : Similar, but lacking the red of the crown. Wing, 4.90-5.00; culmen, .85-.90. *Hab.*—Table-lands of Southern Mexico.

9. *C. ELEGANS*. ♂ : Crown and occiput rich crimson-scarlet, nape bright orange or yellow; orbits surrounded by black, broader above and behind the eye; rest of head smoky grayish, tinged more or less anteriorly with golden yellow; abdomen tinged with golden yellow; upper parts broadly barred with black and white; both webs of middle tail-feathers broadly barred with white. ♀ : Similar, but crown and occiput ash-gray, the latter sometimes suffused with black. Wing, 4.50-4.90; culmen, .95-1.10. *Hab.*—Western Mexico.

10. *C. SUPERCILIARIS*. ♂ : Pileum and nape bright crimson-scarlet, with a large longitudinal patch of black on each side of the crown, extending from the anterior angle of the eye to the occiput; rest of head, including band across forehead, dull whitish, changing gradually to buffy drab on breast, etc.; middle of abdomen bright red; upper parts broadly barred with black and white, the back tinged with buff-yellow; inner webs of middle tail-feathers white, with broad bars of black, the outer webs with a longitudinal stripe of white. ♀ : Similar, but whole forehead and anterior part of crown white, the posterior portion of the crown, and the occiput, black, this confluent with the black superciliary patches. Wing, 5.40-6.00; culmen, 1.30-1.65. *Hab.*—Cuba.

B. Rump bright blood-red, or crimson-scarlet.]

11. *C. STRIATUS*. ♂ : Pileum, nape, lower rump, and upper tail-coverts bright scarlet-erimson; lower posterior side of neck with longitudinal stripes of black and dingy white; remainder of head and neck smoky-gray, gradually changing to deep smoke-brown on breast, etc.; abdomen, crissum, etc., light yellowish olive-green, without markings; upper parts (back, etc.), broadly barred with black and bright yellowish olive-green; middle tail-feathers solid black. Wing, 4.30-5.20; culmen, 1.00-1.30. *Hab.*—Hayti and St. Domingo.

## 1. CENTURUS CAROLINUS.

*Épiche ou Pic rayé de la Louisiane*, BUFF. Ois. vii, 73.

*Pic rayé, de la Louisiane*, BUFF. Pl. Enl. 692 (♀ ad.).—VIEILL. N. D. xxvi, 90.

*Picus ventre rubro*, CATESBY, Car. i, 19, pl. 19, f. 2.

*Picus carolinus*, LINN. S. N. ed. 10, i, 1758, 113 (based on Catesby, l. c.); ed. 12, i, 1776, 174.—WILS. Am. Orn. i, 1803, 115, pl. 7, fig. 2.—NUTT. Man. i, 1832, 572.—AUD. Orn. Biog. v, 1839, 169, pl. 415; Synop. 1839, 183; B. Am. iv, 1842, 270, pl. 270. SUNDEV. Consp. Pic. 1866, 53.

*Centurus carolinensis*, SWAINS. Classif. B. ii, 1837.

*Centurus carolinus*, BONAP. Comp. List, 1838, 40; Consp. i, 1850, 119.—BAIRD, B. N. Am. 1858, 109; Cat. N. Am. B. 1859, no. 91.—DRESSER, Ibis, 1865, 469 (S. Texas; common resident).—ALLEN, Pr. Essex Inst. iv, 1864, 53 (Massachusetts; accidental); Bull. M. C. Z. ii, 1871, 306 (Florida); iii, 1872, 180 (Kansas).—COUES, Key, 1872, 196; Check List, 1873, no. 306; B. N.-W. 1874, 239.—RIDGW. Bull. Essex Inst. Nov. 1873, 185 (Colorado); Field & Forest, June, 1877, 209 (Boulder Co. Colorado); Cat. N. A. B. 1880, no. 372; Nom. N. A. B, 1881, no. 372.—B. B. & R. Hist. N. Am. B. ii, 1874, 554, pl. 52, figs. 1, 4.—NELS. Bull. Essex Inst. viii, 1876, 116, 153 (n. e. Illinois: rare sum. res. leaving last of Oct.: comm. in migr.).—MERRIAM, Trans. Conn. Acad. iv, 1877, 65 (accid. in Connecticut).—BREWST. Bull. Nutt. Orn. Club, ii, Oct. 1877, 108 (do.).—MEARNS, ib. July, 1878, 146 (Cornwall, N. Y. Sept. 1870).

*Zebropicus carolinus*, MALH. Mém. Ac. Metz, 1849, 361; Mon. Pic. ii, 1862, 234; iv, 1862, pl. ciii, figs. 7 (♂ ad.) 8 (♀ ad.).

*Melanerpes (Centurus) carolinus*, RIDGW. Ann. Lye. N. Y. Jan. 1874, 378 (Illinois).

*Picus zebur*, BODD. Tabl. P. E. 1783 (ex Pl. Enl. 602).

*Picus griseus*, VIEILL. O. A. S. ii, 1807, pl. 116 (♂ ad.).

*Picus erythrauchen*, WAGL. Syst. Av. 1827, no. 38; Isis, 1829, 513.

*Le Pic Carolin*, VALENC. Dict. Sc. Nat. xi, —, 181.

*Le Pic gris*, VIEILL. l. c.

*Pic gris rayé*, VIEILL. N. D. xxvi, 77.

*Pic rayé gais*, VIEILL. "Dict. pitt. hist. nat. p. 627."

*Red-bellied Woodpecker*, CATESBY, Car. i, 1731, 19, et auct.

*Carolina Woodpecker*, LATH. Synop. i, 1781, 570.

*Le Pic-à-tre de la Caroline*, }  
*Pic-à-tre Carolin*, } MALH. l. c.

*Hab.*—Eastern United States, west to the eastern slope of Rocky Mountains, south to Florida and Texas. Rare in northern States, and apparently wanting in the valley of the Rio Grande. Most numerous in the Mississippi Valley and Gulf States.

*Adult ♂*: Entire pileum and nape bright scarlet, deepest on the crown, the forehead lighter, or more pinkish (sometimes approaching reddish white); rest of the head and neck, with lower parts, pale buff-grayish, lighter on the chin and throat; middle of the abdomen pinkish red, the remainder of the lower parts sometimes tinged with the same, especially on the breast and cheeks; tibiae and crissum white, relieved by rather sparse hastate marks of black. Back scapulars and upper part of rump broadly and distinctly barred with black and white, the two colors in about equal proportion, or the black bars rather the wider; wings black, the coverts and secondaries barred with pure white; primaries tipped with white, narrowly margined with the same beyond their emargina-

tions, and blotched with white near the base; upper tail-coverts and lower part of rump white, relieved by rather sparse irregularly hastate spots or bars of black, the coverts sometimes nearly immaculate. Tail black; the inner webs of the *intermediate* chiefly white, crossed with a greater or less number of broad black bars, or transverse spots, the outer webs with a longitudinal stripe of white on the basal half; outer rectrices broadly barred at the ends with dull white, and with spots of the same indenting the outer web; next pair of feathers tipped with yellowish white. *Adult* ♀: Similar to the ♂, but red of the crown replaced by deep ash-gray, lighter anteriorly; lower parts tinged with red only on the abdomen, and cheeks with little if any red tinge. *Young* ♀: Whole pileum dull brownish gray, transversely mottled with darker; nape dull light fulvous-red; back and scapulars barred with grayish white and grayish dusky, much less sharply than in the adult; abdomen tinged with dull buff, but without red. *Adult*: Total length (fresh specimens), 9-10½ inches; extent, 15½-17½; wing (skins), 4.85-5.40; tail, 3.50-3.90; culmen, 1.00-1.20; tarsus, .80-.90. Bill (in life), slate-black, the basal portion of gonys sometimes mixed with light ashy; iris varying from ferruginous to bright scarlet; naked orbital spaces olivaceous-ashy; legs and feet olivaceous. In the *young*, iris brown.

Among adult males of this species, the principal variation is in the amount of red tinge on the lower parts. In most examples from the Atlantic States and in many from the Mississippi Valley, the reddish is entirely confined to the middle of the abdomen, while on the head there is a mere tinge of it on the lores and cheeks. Many western specimens, however, have the breast more or less strongly tinged with purplish pink, while two now before me (No. 34317, Kansas City, Mo., May 14, 1864, E. Cones, and one, in my own collection, from Mount Carmel, Ill. May 28, 1878), have not only the lores and cheeks, but the whole chin and upper throat also, bright salmon-color, or saffron-pink. In these highly-colored specimens the forehead is a bright saffron-red, while the Kansas City specimen above alluded to has the red on the abdomen very intense, approaching a saffron-scarlet. Floridan specimens are slightly smaller than northern ones, have the white bars of the dorsal region narrower, but are on the average less richly colored than examples from the Mississippi Valley, only one of five adult males approaching those described above in the depth and extent of the red tinge to the lower parts, throat, etc. The under surface is usually more dingy than in northern examples, while the forehead appears to be lighter red, more abruptly contrasted with the intense crimson-scarlet of the crown. Of six adult females from South Florida, two (Nos. 395, coll. H. W. Henshaw, Cedar Keys, December 6, 1871, and 4924, Amelia Island, G. Würdemann), have the occiput slightly mottled with black. Two examples from Southern Illinois, in my own collection (obtained October 15, 1873, and October 7, 1879), agree in this respect, however, with these Florida examples. They likewise have the black bars of the

dorsal region equally wide, but they are decidedly larger birds. A male from Waller County, Texas (No. 70963, Kumlien and Earll), agrees in every respect with Illinois examples. An adult female from Southern Illinois (Mount Carmel, October 18, 1879), has the occiput red, like the nape, while there are several red feathers in the middle of the crown.

## 2. CENTURUS TRICOLOR.

*Picus tricolor*, WAGLER, Isis, 1829, 512 (♂ ad.; "Mexico").

*Centurus tricolor*, LICHT. Nomencl. 1834, 76.—SCL. Cat. 1862, 343, no. 2049 (Bogotá; Venezuela).—TAYLOR, Ibis, 1864, 93 (Venezuela).—SCL. & SALV. P. Z. S. 1864, 337 (Isth. Panama); Nom. Neotr. 1873, 100 (Venezuela, Colombia, Veragua).—SALVIN, P. Z. S. 1867, 157 (Veragua); 1868, 169 (Venezuela).—WYATT, Ibis, 1871, 381 (Sta. Marta, Colombia).

*Zebicapicus tricolor*, MALH. Mon. Pic. ii, 1862, 247; iv, pl. cvi, figs. 1, 2 (♂ and ♀ ad.).

*Centurus carolinus* var. *tricolor*, B. B. & R. Hist. N. Am. B. ii, 1874, 554.

"*Centurus subelegans*" REICH. Handb. 1851, 411, pl. delxv, figs. 4415-16 (nec Bonap. 1837).—SCL. P. Z. S. 1855, 162; 1856, 143.

"*Centurus rubriventris*", LAWRE. Ann. Lyc. N. Y. vii, 1861, 299 (Panama; nec Swains. 1838).

*Le Picizèbre tricolore*, }  
*Picizèbre tricolor*, } MALH. l. c.

*Adult ♂*: Forehead dull smoky whitish, more or less tinged with yellow anteriorly (on the frontal feathers); crown, occiput, and nape, bright crimson-scarlet, lighter posteriorly, occasionally interrupted by a band of smoky gray or light drab across the occiput; remainder of head and neck, with lower parts, smoky drab, the head lighter anteriorly; middle of the abdomen bright scarlet; tibiae and crissum marked with broad V-shaped bars of black. Back and scapulars broadly barred with black and white, the bars of the latter narrower than the black ones; wings black, the coverts and secondaries broadly barred with white; primaries bordered terminally with white, and blotched with the same near the base. Upper tail-coverts and most of the rump white, often immaculate, sometimes irregularly and scantily barred with dusky. Tail black, both webs of the *intermediae* broadly barred or transversely spotted with white; lateral rectrices hoary smoky drab on the under surface, the terminal portion with several more or less complete whitish bars. *Adult ♀*: Similar to the ♂, but red of the pileum replaced by light drab, growing gradually paler anteriorly. Bill blackish; feet dusky (olivaceous in life?). *Young ♀*: Similar to the adult, but all the markings less sharply defined, and the colors duller. *Young ♀*: More dully colored than the adult, the nape dull orange-fulvous, instead of scarlet, the bars of the back, etc., more indistinct, and tinged with light brownish. Wing, 4.05-4.55; tail, 2.50-2.70; culmen, .75-1.10; tarsus, .75-.80.

In general appearance this species is quite a miniature of *C. carolinus*, but it is probably distinct specifically. Close inspection reveals many points of difference besides the very much smaller size. The frontlet is



yellow instead of pinkish red, and the deep red of the crown is very abruptly defined anteriorly against the whitish of the forehead, instead of blending into the color of the frontlet, there being no trace of a whitish frontal band in *C. carolinus*; the abdomen in *C. tricolor* is bright scarlet, instead of light pinkish red. In *C. carolinus* the tibiae and lower tail-coverts have a few longitudinal, irregularly sagittate marks of dusky, whereas these parts in *tricolor* are heavily banded with transverse, somewhat V-shaped bars. In *carolinus* only the inner webs of the middle tail-feathers are barred or spotted with white, while in *tricolor* both webs are so marked. *C. tricolor* is also very much darker colored underneath than *C. carolinus*. The females of the two species do not resemble one another so closely as do the males. In that of *C. tricolor* the red of the nape is both more restricted and duller than in that of *C. carolinus*, the pileum is of a light smoky drab, instead of pure ash-gray, and the forehead is dull whitish, tinged with yellow anteriorly, instead of pinkish red.

These comparisons apply to the most southern examples of *C. carolinus* I have been able to examine, viz, a considerable number from Texas and South Florida.

In this species, as in most others, there is much individual variation. In a majority of the adult males the red of the nape is continuous with that of the crown, but in some (as in an example from New Granada, in the collection of Salvin and Godman), the occiput is completely crossed by a wide band of light smoky drab, widely separating the orange-red of the nape from the bright crimson vertical patch. Other examples show a more or less complete coalescence of the two red areas, in variable degree, according to the individual. Such examples appear to include adults as well as young birds, so that age has apparently nothing to do with the variation in question. In specimens having the crimson of the crown widely separated from the more flame-colored red of the nape there is a rather close resemblance to some specimens of *C. hoffmanni*, in which, however, the abdomen is yellow instead of bright red, the outer webs of the middle tail-feathers streaked, instead of barred or spotted, and the nape decidedly red, instead of orange-yellow.

### 3 (?). CENTURUS RUBRIVENTRIS.

*Centurus rubriventris*, SWAINS. Ann. in Menag. 1838, 354 (hab. ignot.).—GRAY, Gen. B. ii, 1849, 442.—LAWR. Ann. Lyc. N. Y. ix, 1869, 206 (Yucatan).

*Zebrapicus rubriventris*, MALH. Mon. Pic. ii, 1862, 248; iv, 1862, pl. cvii, fig. 1 (♂ ad.). (Mexico?)

"*Zebrapicus swainsonii*", MALH. 1845, in mus Britan." (MALHERBE.)

"*Picus aurifrons*", BONAP. P. Z. S. 1837, 116 (nec Consp. i, 1850, 119). (Fide MALHERBE.)  
*Piezèbre à ventre sanguin*, MALH. l. c.

*Hab.*—Yucatan.

This bird, which appears to be a well-defined form, I have not seen, and therefore copy Swainson's original description, and Mr. Lawrence's remarks in Ann. Lyc. N. Y., ix, 1869, pp. 206-7, which, with Malherbe's



account, is all that is known regarding it. The specimen in the Smithsonian collection alluded to by Mr. Lawrence has unfortunately been mislaid, so that I am unable to make a direct comparison.

Swainson's description is as follows:—

"Front of the head, cheeks, and chin golden yellow; ears, and connected stripes over the eyes, cinereous white; nape, middle of the crown, and the belly, crimson; rump, pure white.

"Inhabits ——? Mus. Nost.

"This most elegant species is the smallest *Centurus* I have yet seen. Total length,  $7\frac{8}{10}$  inches; bill, gape 1; front,  $\frac{8}{10}$ ; wings,  $4\frac{3}{10}$ , nearly as long as the tail, which from the base is 3; tarsus,  $\frac{6}{10}$ . Upper plumage, as in the last, banded with black and white; the latter being narrower than the former; the broad grayish-white band over each eye unites in front, and there becomes white, so as to separate the golden yellow round the bill from the crimson of the crown; the yellow covers all the face before the eye, and passes round the chin; the under plumage is light cinereous gray, the middle of the body and belly being tinged with crimson; the tail-feathers are black and unspotted, except the base of the middle pair and a few spots and obsolete bands on the outermost; bill deep black."

With regard to a specimen from Yucatan, supposed to be the same as Swainson's bird, Mr. Lawrence (*l. c.*) writes as follows:—

"A single male specimen agrees closely with Swainson's description; its validity, as a species, has been doubted by many writers, and generally referred to *C. tricolor*, though admitted to be distinct by Malherbe, and accurately figured and described in his splendid *Mon. of the Picidae*. It seems to be very rare, as Malherbe states that besides Swainson's example he only knows of the male in his own collection. With specimens before me of *C. tricolor* from Bogota, St. Martha and Panama, the distinctness of the two species does not admit of a question. As stated by Malherbe, the bands on the upper plumage of *tricolor* are twice the width of those of *rubriventris*; in the last species the transverse white lines on the back are similar to those of *C. albifrons*, while in *tricolor* they are much as in *C. aurifrons*; another marked difference is in the central tail-feathers; those of *tricolor* are deeply and broadly indented with white on both webs, whereas in the example of *rubriventris* these feathers are black, except for a small space at the base on the outer web, where it is white, this color extending higher up next the shaft. In size and general coloring the two species are much alike.

"The acquisition of this specimen is of much interest, as it helps to set at rest any doubt of its claim as a distinct species, and determines its locality heretofore unknown, though supposed to be some part of Mexico."

## 4 (?). CENTURUS TERRICOLOR.

*Centurus terricolor*, BERLEPSCH, Ibis, Jan. 1880, 113 ("Orinoco district or Trinidad").  
 "Affinis *C. tricolori* (ex Bogotà), sed major, et rostro longiore, latiore; capitis lateribus, gulâ et abdomine toto obscurè brunneo-olivaceis; ventre medio obscurè rubro (nec flavo-rubro); tectricibus candæ superioribus inferioribusque nigro regularitur fasciatis, primo viso distinguendus. Long. alæ 108, candæ 60, rostri 24, tarsi 19."

Judging from the above description, this bird closely resembles *C. tricolor*, but is much darker colored, and with the upper tail-coverts much more distinctly and regularly barred than in that form. It is possibly a local race of *C. tricolor*.

## 5. CENTURUS AURIFRONS.

*Picus aurifrons*, WAGL. Isis, 1829, 129, 512 (♂ ad.; Mexico).—LICHT. Nomencl. 1854, 76.—SUNDEV. Consp. Pic. 1866, 53.

*Centurus aurifrons*, GRAY, Gen. B. ii, 1849, 442.—BONAP. Consp. i, 1850, 119.—CABAN. J. f. O. 1862, 323.—COOPER Orn. Cal. i, 1870, 399 (Texas).—COUES, Key, 1872, 196, Check List, 1873, no. 307.—B. B. & R., Hist. N. Am. B. ii, 1874, 577, pl. lii, figs. 3 and 6.—SENNETT, Bull. U. S. Geol. & Geogr. Surv. Terr. iv, no. 1, 1878, 39 (Hidalgo and Brownsville, Texas; abt.).—MERRILL, Pr. U. S. Nat. Mus. i, 1878, 151 (Ft. Brown, Texas, abt.).—RIDGW. Cat. N. Am. B. 1880, no. 373: Nom. N. A. B. 1881, no. 373.

*Zebrapicus aurifrons*, MALH. Mon. Pic. ii, 1862, 240; iv, pl. 104, figs. 1-3 (♂ and ♀ ad., ♂ juv.).

*Centurus subelegans*, BONAP. P. Z. S. Nov. 14, 1837, 109 (♂ ad.; Mexico); Consp. i, 1850, 119; Notes Delatr. 1854, 85; Consp. Zygod. 1854, no. 220 (excl. syn.).

*Centurus flaviventris*, SWAINS. Ad. in Menag. 1838, 354 (hab. ignot.; ♂ ad.).—SCL. P. Z. S. 1857, 8.—BAIRD, B. N. Am. 1858, 110; ed. 1860, pl. 42; Cat. N. Am. B. 1859, no. 92; Mex. Bound. Surv. ii, 1859, 5, pl. 4.—HEERMAN, Pacific R. R. Rep. X. c. 1859, 18.—DRESSER, Ibis, 1865, 469 (R. Grande, n. e. to Guadalupe R.; resid.).

*Picus ornatus*, LESS. Mag. Zool. 1839, 102 (♂ ad.).—WEIGM. Arch. für Naturg. 1841, 99.

*Centurus ornatus*, REICH. Handb. 1854, 410, pl. 664, figs. 4409-10.

"*Centurus elegans*", LAWR. (nec SWAINS.) Ann. Lye. N. Y. v. Apr. 28, 1851, 116 (Texas).

"*Centurus Santa-Cruzi*," LAWR. (nec BONAP.) Ann. Lye. N. Y. v, 1851, 123 (W. Texas).

*Yellow-bellied Woodpecker*, BAIRD, I. c. et AUCT.

*Golden-fronted Woodpecker*, COUES, I. c.

*Le Piczèbre à front d'or* } MALH. Il. c.

*Pic-Zèbre à Front d'or* }

*Hab.*—Table-lands of Mexico, north to the Guadalupe River in Southern Texas.

*Adult* ♂: Frontlet yellk-yellow; nape, bright orange-yellow, varying to orange-red in some specimens; occiput (usually) and sides of the crown ash-gray; middle of the crown covered by a patch (usually isolated) of bright crimson-scarlet; rest of the head, including a band across the forehead, dingy ashy white, or pale dingy ash, as are also the lower parts back to the flanks and abdomen; middle of the abdomen more or less deeply tinged with yellk-yellow; tibiæ and crissum grayish white, marked with irregular broad V-shaped bars of black. Back, scapulars,

wing-coverts, and upper part of rump barred, in about equal proportions, with black and white, the former predominating on the wings; secondaries black, broadly barred with white; primaries black, tipped with white, and with a somewhat broken but conspicuous patch of the same near the base, on the outer surface; upper tail-coverts and lower part of rump white, usually nearly or quite immaculate. Tail black, the inner webs of the *intermediae* usually wholly black, but very rarely (in only one among twenty-five specimens) with a slight blotching of white toward the base, and partially concealed by the coverts; outer rectrices inclining to hoary drab on the under surface, the outer webs notched with white toward the end, and the terminal portion of the inner web with one or two bars of white; next feather sometimes tipped with brownish white or light brown. *Adult* ♀: Similar to the male, but red crown-patch wanting, the whole pileum being ash-gray, lighter anteriorly. *Young* ♂ (not full grown): Colors much more dingy than in the adult, and all the markings less clearly defined. Pileum dull light grayish brown, the feathers somewhat mottled with dusky, passing gradually into light yellowish fulvous on the nape, the middle of the crown dull red; back washed with fulvous; breast streaked with black. (No. 45044, Laredo, Tex., July 28. 1866; H. B. Butcher.) Bill slate-black; feet dusky (olivaceous in life?). Wing, 5.20-5.65; tail, 3.40-3.75; culmen, 1.20-1.40; tarsus, 1.00.

Decidedly the largest specimen among the twenty-five before me is an adult male from Silao, Mexico (Mme. Verdey), in the collection of Messrs. Salvin and Godman. In this the red crown-patch is very large, covering the entire vertex, and anteriorly touching the orange-yellow frontlet, thus almost obliterating the usual grayish white frontal band; the nape is a deep reddish orange, more yellow below. No. 46815, from Laredo, Texas (January 16, 1867; H. B. Butcher), also has the red crown-patch very large, and the nape still more intense flame-color than the preceding; the white frontal band is well defined and complete, however, though posteriorly the red crown very nearly joins the orange-red of the nape along the middle line. No. 74677, Medina County, Texas, (April 19, 1878; G. H. Ragsdale), has the whitish frontal band broader, and the red crown much more restricted, though posteriorly it apparently does join the bright orange nape in the middle portion. In most examples, however, the red on the crown forms a thoroughly isolated patch of variable form (oval, shield-shaped, or squarish, according to the "make" of the skin), the nape bright orange-yellow, and the frontal band, of grayish white, broad and complete. In the female the yellow of the nape is usually much less intense than in the male, in one example belonging to Messrs. Salvin and Godman's collection (vicinity of Mexico City, Boucard) being of a dull oily-yellow hue.

An adult male from Texas, in Mr. Lawrence's collection, has the red of the crown completely confluent with that of the nape, exactly as in typical *santacruxi*, except that the gray of the superciliary region en-

croaches a very little on the sides of the occiput; the deep golden yellow of the forehead is unusually extended posteriorly, leaving only a narrow bar of white between it and the red; the nape is decidedly more flame-colored than the crown, and changes quite abruptly below and along each side into olivaceous golden yellow. The lower parts are as light as in the most extreme examples of *aurifrons*, while the flanks and crissum are entirely destitute of bars, having, instead, longitudinal sagittate marks of black. The inner webs of the *intermediae* are solid black.

### 5a. CENTURUS AURIFRONS SANTA-CRUZI.

*Centurus Santa Cruzei*, BONAP. P. Z. S. Nov. 14, 1837, 116 (♂ ad.; Mexico); Consp. i, 1850, 119; Consp. Zygod. 1854, no. 221.—SCL. P. Z. S. 1856, 343; 1858, 359; 1859, 337 (Jalapa); 1860, 286, 297; 1864, 177 (city of Mexico); Catal. 1862, 343, no. 248 (S. Mexico; Salama, Guatemala).—SCL. & SALV. Ibis, 1859, 136 (Guatemala).—OWEN, Ibis, 1861, 67 (San Geronimo, Guat.; descr. eggs).

*Zebrapicus santa-cruzi*, MALH. Mon. Picid. ii, 1862, 241; iv. pl. cv, figs. 4 (♂ ad.) 5 (♀ ad.).

*Picus Grateloupensis*, LESS. Mag. Zool. 1839, 41 (♂ ad.; Mexico).

*Centurus grateloupensis*, BONAP. Consp. Zygod. 1854, no. 223 (excl. syn.).

"*Picus subelegans*", LESS. Descr. d'Ois. réc. déc. 1847, 206 (nec Bonap. 1837).

*Picus chrysogenys*, VIG. Zool. Beechey's voy. 1840, 24.—WEIGM. Archiv. 1841, 99.

"*Centurus aurifrons*", LAWRE. Bull. U. S. Nat. Mus. no. 4, 1876, 35 (Chihuitan, Juchitan, and Sta. Efigenia, Isth. Tehuantepec; Nov., Jan.).

"*Centurus albifrons*", CABAN. J. f. O. 1862, 324.—SCL. & SALV. P. Z. S. 1869, 364; Nom. Neot. 1873, 100. (Probably not *Picus albifrons*, Swains., which apparently = *C. radiolatus*.)

*Centurus polygrammus*, CABAN. J. f. O. Sept. 1862, 326 (St. Bartolo, S. Mexico).

*Le Pic de Grateloup*, LESS. Rev. Zool. 1839, 41.

*Le Pic subélegant*, LESS. Descr. d'Ois. réc. déc. 1837, 206.

*Le Piczèbre de Santa-Cruz*, MALH. l. c.

*Hab.*—Southern Mexico, Honduras, and Guatemala.

*Adult ♂*: Frontlet yellowish, varying from pale yolk-yellow to bright orange, with a red tinge centrally; entire crown and nape bright red, darker (deep scarlet-crimson) anteriorly, lighter and brighter on the nape, the lower part of which is more or less tinged with orange; the occiput sometimes ash-gray laterally, thus partly separating the deep red of the crown from the more orange hue of the nape; forehead and anterior part of superciliary region ashy white, forming a distinct and sharply-defined band across the former; remainder of the head light dingy ash (sometimes tinged with dingy yellow anteriorly), deepening gradually into olive-drab on the jugulum, breast, and sides; abdomen rather dull orange-yellow, in some specimens inclining to orange-red; tibiae, anal region, and crissum pale fulvous, or dingy yellowish white, thickly barred with blackish, the bars inclining to V-shape, especially on the crissum. Back, scapulars, wings, and tail black, narrowly barred, except on the primaries and tail, with white; upper tail-coverts and rump immaculate pure white, the shafts of the former brownish or dusky; primaries narrowly skirted with white beyond their emarginations, more



broadly tipped with the same, and (usually) with more or less of whitespotting near the base on the outer webs; inner webs of middle pair of tail-feathers usually more or less marked with white (very rarely solid black); outer rectrices hoary drab on the under surface, the outer edge indented with small white spots, or indications of bars, the end portion of the inner webs usually with one or more white bars (sometimes with none). *Adult* ♀: Similar to the ♂, but entire pileum light ash-gray, becoming lighter anteriorly; nape varying from bright saffron-yellow to scarlet, with scarcely a tinge of orange. *Young* ♂: Similar to the adult, but all the markings much less distinct, and the colors duller. Bill black; iris bright red; feet olive-greenish. (MS. notes on labels.) Wing, 5.00–5.75; tail, 3.10–4.00; culmen, .95–1.25; tarsus, .90–1.00.

Whether the present form is to be regarded as a distinct species or not, there can be no question, that it grades directly into three other forms, viz, *C. aurifrons*, *C. dubius*, and *C. hoffmanni*. In its typical condition, however, it is a very strongly characterized race. Among the large series of specimens now before me, many striking variations from the normal type are observable; some of them tending to one or the other of the above-named races, others quite unique in their characteristic features. In most of the adult males, the red of the nape is entirely continuous with that of the crown; but in some (as in No. 57834, Sta. Efigenia, Isth. Tehuantepec, Jan. 10, 1869, F. Sumichrast, and 27955, Mirador, C. Sartorius), the occiput is crossed by a band of ash-gray, almost completely separating the two bright-colored areas. In the former of the above specimens, the head is colored throughout exactly as in some examples of pure *C. aurifrons*, the nape being bright orange, markedly different from the deep red of the crown, and barely connected with it along the median line; but the lower parts are of a deep olivaceous drab, the abdomen deep saffron, and the posterior parts densely barred, as in typical *santacruzii*. The upper parts are more broadly banded with white than in true *santacruzii*, but less widely than in either *aurifrons* or *hoffmanni*. A near approach to the latter form is seen in the broad and distinct white bars (about 7 in number) on the inner webs of the middle rectrices, the outer webs of which are marked with a long narrow white stripe; but the size is much greater, the dimensions fully equalling the maximum of *aurifrons* (wing 5.60, tail 4.10, culmen 1.25). The Mirador specimen is evidently a young bird, and has the inner webs of the middle rectrices chiefly occupied by a large longitudinal blotch of white. Another adult male from the Isthmus of Tehuantepec (No. 57836, Chihuitan, Nov. 20, 1868, F. Sumichrast) is in all respects like the one described, except that the nape is deep orange-red, and this color more completely coalesced with the crimson of the crown. It is also equally large (wing 5.70 tail, 4.00, culmen 1.12). *C. polygrammus*, of Cabanis, appears to have been based upon specimens representing this style. Adult females from the Isthmus of Tehuantepec agree with the males in the broadness of the white bars of the dorsal surface, and the white markings of the middle



rectrices; one of them (No. 57835) has the nape bright golden yellow, the other (No. 54197, Juchitan, Sept. 8, 1868) saffron-orange. Both have the outer webs of the primaries largely blotched with white toward the base. As to the females, there appears to be no correlation between the color of the nape and the locality; those with deep red napes coming, respectively, from Baoul, Coban, and Dueñas, Guatemala, and the city of Mexico, those with orange napes from Eastern Mexico (Jalapa and Mirador), Guatemala (Retalulen), and Western Mexico. Two examples from Honduras, in the collection of Messrs. Salvin and Godman, are remarkable chiefly for their small size. The male (San Pedro, G. M. Whitely) is very intensely colored, the white bars of the dorsal region narrower than in any skins from Guatemala or Mexico, and very strongly tinged with fulvous, the lateral and lower portions of the head deep olive-drab, in marked contrast with the white frontal crescent, the white of the rump stained with fulvous-yellow, and the lower parts much deeper olivaceous than other specimens; the inner webs of the middle rectrices are solid black. The measurements of this specimen are as follows: Wing, 5.00; tail, 3.30; culmen, 1.15; and tarsus, .88. The female (Julian, G. M. Whitely) is of abnormally small dimensions, measuring, wing, 4.60; tail, 2.90; culmen, .95; tarsus, .80. It appears, however, to be an immature bird, and may not have attained its full size. In colors, it is very dark, like the male from San Pedro.

It is not uncommon for very highly-colored examples to have the white of the rump and upper tail-coverts more or less tinged with yellow.

### 5b. CENTURUS AURIFRONS DUBIUS.

"*Picus carolinus*", CABOT (nec LINN.), App. Stephens' Trav. ii., —, 475. (Uxmal, Yucatan.)

*Picus dubius*, CABOT, Jour. Bost. Soc. N. H. v, 1845, 91. (Uxmal, Yucatan.)

*Picus erythrophthalmus*, LICHT. "Cat. MSS. Mus. Berol. 1844"; Nomencl. 1854, 76.—REICH. Handb. Oct. 1854, 403, tab. 664, figs. 4396-7 (♂, ♀ ad.).

"*Zebrapicus erythrophthalmus* (Licht.);" MALH. Mon. Pict. ii, 1862, 243; iv, pl. cv, figs. 1-3.

"*Centurus albifrons* (Sw.)", LAWR. Ann. Lyc. N. Y. ix, 1869, 205. (Yucatan.)

"*Picus capistratus*, LICHT. Mus. Berol. 1841, nec NATTER." (MALHERBE.)

*Picizèbre aux yeux rouges*, MALH. l. c.

*Adult ♂*: Entire pileum and nape bright crimson-scarlet (much as in *C. carolinus*), without a trace of orange tinge; frontlet scarlet, separated from the deeper red of the crown by a narrow band of dull, smoky white, or grayish white (sometimes nearly pure white), across the forehead; rest of head and neck light ashy drab, approaching smoky grayish white, deepening on the jugulum, breast, sides, flanks, and upper part of abdomen into light olive-drab, or smoky gray; middle of abdomen bright scarlet, usually without trace of orange tinge; tibiae, anal region, and crissum, grayish white, thickly marked with V-shaped bars of black. Back, scapulars, wing-coverts, and upper part of rump black, with sharply-defined narrow bars of white, much narrower than

the black bars (averaging about half as wide); secondaries narrowly barred with white; primaries black, margined terminally with white, and with a few irregular spots of the same near base of outer webs; upper tail-coverts and rump immaculate pure white. Tail deep black, the under surface hoary drab, and the lateral pair of feathers sometimes showing indications of narrow white bars near the end. *Adult ♀*: Similar, but the whole crown light drab-gray, becoming lighter anteriorly (nearly white on the forehead). Bill slate-black; feet dusky (olivaceous in life?). Wing, 4.95-5.40; tail, 3.40-3.80; culmen, 1.00-1.30; tarsus, .90-.95.

This form is evidently most closely related to *C. santaeruzi*, but it may be immediately distinguished, in its typical condition, by the entire absence of even the slightest trace of orange in the red of the nape, while the frontlet and abdomen are a pure deep scarlet, instead of orange-yellow. In other respects, however, there is a very close correspondence in all the colors and markings, even to a minute degree, almost the only difference consisting in the white bars of the dorsal surface being still narrower. In the red abdomen, and pure red pileum, nape, and frontlet, there is a closer resemblance to *C. carolinus* than to *C. santaeruzi*, but the red of all the parts named is more intense, while the forehead is invariably crossed by a sharply-defined band of nearly pure white. In other respects the two are very different, *C. carolinus* having the white bars on the back, etc., about three times as wide, the upper tail-coverts varied with black, the middle tail-feathers largely varied with white, etc. Comparing the females of the two species, the present one has the crown an altogether lighter gray, and the red of the nape and frontlet much more intense—the latter also more abruptly defined.

It is not to be supposed, however, that the characters of this form, as given above, are absolutely constant, for this is not the case; on the contrary, specimens now before me plainly indicate, if they do not actually prove, intergradation with *C. santaeruzi*. Specimens from northern Yucatan are, so far as I have seen, purely typical; but an adult male in Mr. Lawrence's collection, *said* to be from Guatemala, has the red of the belly decidedly lighter and more flame-colored than in Yucatan examples, while an adult female from Orizaba agrees with it in this respect. The former, moreover, has the inner webs of the middle pair of rectrices deeply notched with white, while the latter has a considerable quantity of white blotching on the inner webs of the same feathers, the outer webs of which are marked, on their basal half, with a conspicuous longitudinal stripe of white, mostly concealed, however, by the upper coverts. In this example, the white bars above are broader (about as in average specimens of *santaeruzi*), while the dark bars of the flanks and crissum, as well as the white ones of the terminal portion of lateral rectrices, are much broader than usual.

The type of *Picus dubius*, Cabot, which has been kindly loaned me by its describer, is a fully adult male agreeing in all respects with other specimens from northern Yucatan.

## 5c. CENTURUS AURIFRONS HOFFMANNI.

*Centurus hoffmanni*, CABAN. J. f. O. x, 1862, 322 (Costa Rica).—LAWR. Ann. Lye. N. Y. ix 1863, 131 (San José and Grecia, Costa Rica).—SCL. & SALV. Nom. Neotr. 1873, 100 (Costa Rica).

*Picus hoffmanni*, SUNDEV. Consp. Pic. 1866, 54.

*Centurus aurifrons* var. *hoffmanni*, B. B. & R. Hist. N. Am. B. ii, 1874, 554.

*Hab.*—Costa Rica.

*Adult* ♂: Frontlet, pale dull yellow; forehead and anterior part of superciliary region, dull whitish; crown crimson-scarlet; nape saffron-yellow, varying to orange, sometimes tinged with orange-red; remainder of the head deep smoky gray (lighter anteriorly and underneath), the lower parts similar, but darker; abdomen deep saffron-yellow; tibiae, anal region, and crissum heavily barred with black, the bars on the latter more V-shaped. Back, scapulars, and wing-coverts broadly barred with black and white, the two colors in about equal proportion on the dorsal region, the black in excess on the wings, the white bars on the secondaries being only about half as wide as the interspaces; primaries black, the outer webs tipped with white and usually spotted with the same near the base; upper tail-coverts and lower rump immaculate white, usually faintly tinged with yellow; tail black, the inner webs of the *intermediae* edged with white and deeply indented with broad bars of the same, the outer webs with a narrow longitudinal stripe of white; lateral rectrices hoary drab on the under surface, margined terminally with dull white, the outer web notched along the edge, near the end, with the same, and the terminal portion of the inner web sometimes with one or more indications of white bars. *Adult* ♀: Similar to the ♂, but crown without any red, and yellow of the nape duller and (usually at least) without orange tinge. Bill black; iris hazel (MS. note on label of ♀ ad.); feet dusky (olivaceous in life?). Wing, 4.60–4.75; tail, 2.40–2.90; culmen, .90–1.05; tarsus, .75–.80.

This form presents a curious combination of the features of *C. aurifrons* and *C. santacruzi* with characteristics which are its own. The plumage of the upper parts is exactly that of the former, except that the occiput and sides of the crown are of a decidedly more smoky hue, while the inner webs of the middle tail-feathers are invariably largely marked with white, as described above. The plumage of the lower parts, however, is even darker than in *santacruzi*, though the posterior portions are more coarsely barred, as in *aurifrons*. The peculiar features consist in the small size, and constancy of the white markings on the middle tail-feathers, which is only an occasional feature in *santacruzi* and apparently never occurs in true *aurifrons*.

# 6. CENTURUS RADIOLATUS.

*Picus varius medius jamaicensis*, RAY, Syn. av. 181, no. 11.

*Picus jamaicensis*, EDW. Gleanings, pl. 244 (♂ ad.).

*Pic varié Femelle, de la Jamaïque*, BUFF. Pl. Enl. 597 (♂ ad.).

*Picus carolinus*, part, LINN. S. N. i ed. 12, 1763, 175 (quotes, "*Picus varius medius*, Sloan jam. 2, p. 299, t. 255. *Picus varius jamaicensis*, Briss. av. 4, p. 59. *Picus jamaicensis*, Edw. av. 5, p. 71, t. 244."—Not of ed. 10, 1758, 113, which is based entirely on Catesby).

*Picus radiolatus*, WAGLER, Syst. Av. 1827, *Picus*, no. 39 (♂ ad.; Jamaica); Isis, 1829, 572.

*Centurus radiolatus*, BONAP. Consp. i, 1850, 118; Consp. Zygol. 1854, no. 215.—GOSSE, B. Jam. 1847, 271.—REICH. Handb. 1854, 409, no. 961, pl. delxiii, fig. 4406 (♂ ad.).—SCL. P. Z. S. 1861, 79; Catal. 1862, 343, no. 2046.—MARCH, Proc. Philad. Acad. 1863, 284.—SCL. & SALV. Nom. Neotr. 1873, 100 (Jamaica).

*Zebrapicus radiolatus*, MALIN. Mon. Pic. ii, 1862, 237; iv, pl. civ, figs. 5 (♂ ad.) 6 (♀ ad.)

? *Picus albifrons*, SWAINS. Philos. Mag. i, 1827, 439 (♂ ad.; "Table-lands of Mexico"—error\*).—WAGL. Isis, 1829, 514.—LESS. Compl. Buff. ix, 1837, 318.

*Picus larratus*, TEMM. Pl. Col. livr. 73<sup>e</sup>, 1838, in text, sub *P. superciliaris*.

*Le Pizèbre de la Jamaïque*, MALIN. l. c.

*The Woodpecker of Jamaica*, EDWARDS, l. c.

*Radiolated Woodpecker*, GOSSE, l. c.

*Le front blanc*, LESS. l. c.

## Hab.—Jamaica only.

*Adult* ♂: Pileum and nape bright scarlet-crimson, darkest on the crown; remainder of the head, including forehead, lores, and superciliary stripe, soiled white, changing quite abruptly to smoky drab next to the red of occiput and nape, and on the jugulum, the breast, sides, and abdomen uniform deep olivaceous (slaty plumbeous beneath the surface), and with a deep golden-ochraceous wash in some examples; middle of the abdomen deeply tinged with saffron-red, the tibiae tinged with the same, and indistinctly barred with grayish dusky and dull whitish; crissum black, narrowly and rather distantly barred with dingy white. Upper parts black, relieved by very narrow thread-like bars of white, these widest apart on wings; upper tail-coverts and lower part of rump also black, crossed by broader and more distinct bars of white; tail deep black, the inner webs of middle pair of feathers (sometimes outer webs also) marked with narrow white bars. *Adult* ♀: Similar, but crown and upper part of occiput smoky gray, and the white of the anterior portion of the head more obscured, or dingy. Bill black; feet

\* "Above blackish, transversely marked with white lines, beneath olivaceous; front, chin, and sides of the head white; crown and neck red.

"Table land; rare.

"Total length, 10½; bill, 1<sup>6</sup>/<sub>10</sub>; wings, 5; tail, 4."

This bird has usually been referred to one or another of the forms of *C. aurifrons*. Judging from the above description, however, and especially by Bonaparte's comments in P. Z. S. 1837, p. 116, it seems more probable that the present species was the one Swainson had in view, there being at least one other West Indian bird in the same collection erroneously ascribed a Mexican habitat (*Tyrannula barbirostris*, also from Jamaica).



dusky. *Young* ♀: Similar to the adult, but with red feathers on the middle of the crown. Wing, 5.00–5.40; tail, 3.70–4.30; culmen, 1.30–1.45.

The only species bearing any resemblance to the present one is *C. santacruxi*, which, however, besides being very much smaller, has the upper tail-coverts and lower rump immaculate white, the frontlet golden-yellow or orange, the lower parts much paler, and the white bars of the upper surface much broader. With the exception of *C. superciliaris* (of Cuba), it is the largest member of the genus, and in the decided predominance of black on the rump and lower tail-coverts is entirely peculiar.

## 7. CENTURUS UROPYGIALIS.

*Centurus uropygialis*, BAIRD, Proc. Philad. Acad. vii, June, 1854, 120 (Bill Williams' River, Arizona); B. N. Am. 1858, 111; ed. 1860, pl. 36; Cat. N. Am. B. 1859, no. 93.—REICH. Handb. 1854, 310.—CABAN., J. f. O. 1832, 330 (northern Mexico).—KENNERLY, Pacific R. R. Rep. x, b. 1859, pl. 35.—HEERM. ib. x, c. 1859, 17.—SUNDEVALL, Consp. Pic. 1836, 54.—COUES, Proc. Philad. Acad. 1866, 57 (S. Arizona); Key, 1872, 196; Check List, 1873, no. 308.—COOPER, Orn. Cal. i, 1870, 399 (Ft. Mojave).—B. B. & R. Hist. N. Am. B. ii, 1874, 558, pl. lii, figs. 2 and 3.—RIDGW. Cat. N. Am. B. 1880, no. 374; Nomencl. N. Am. B. 1881, no. 374.

*Centurus sulfureirenter*, REICH. Handb. Oct. 1854, 410, pl. clxiv, figs. 4111–12 (♂ & ♀ ad.).

*Zebrapicus kaupii*, MALH. Mon. Pic. ii, 1862, 245; iv, 1863, pl. cvi, figs. 4, 5 (♂ and ♀ ad.).\*

"*Centurus hypopolius*", PUCH. Rev. et Mag. Zool. 1853, 163 (nec LICHT., ex WAGL.).

*Le Piczèbre de Kaup*, MALH. l. c.

*Gila Woodpecker*, BAIRD, l. c.

*Hab.*—Western Mexico, extending into Arizona (as far as the Gila Valley), southeastern California, and western New Mexico; Lower California.

*Adult* ♂: Head, neck, and lower parts soft, rather light smoky drab, usually deepest on the nape and paler on the forehead; middle of the abdomen pale yolk-yellow, in some specimens inclining to buff; a patch of scarlet-crimson on the middle of the crown; tibiæ and crissum white, broadly barred with black. Back and scapulars broadly and regularly barred with black and white, in about equal proportion; wings black, the coverts and secondaries broadly and sharply barred with pure white; primaries tipped with white, largely blotched with the same near the base, the longer quills narrowly edged with white beyond their emarginations; rump and upper tail-coverts white, regularly barred with black; tail black, the inner webs of the *intermediae* white, broadly barred with black, the outer webs with a stripe of white extending the

\* Malherbe claims (Mon. Pic. ii, p. 245, foot-note) 1853 as the date of his specific name "*kaupii*", on the ground that Bonaparte instituted the name "en effet" by dedicating it, in the *Revue et Magazin de Zoologie* for that year, to "au savant directeur de Musée de Darmstadt". Inasmuch, however, as not even Dr. Kaup's name was given in the passage quoted as evidence, it will readily appear that Professor Baird's specific term *uropygialis* was really the first proposed.



greater length of the feathers; outer pair of rectrices broadly barred with white for at least the terminal half (sometimes the whole length), and next pair with several broad bars across the terminal portion. *Adult* ♀: Similar to the ♂, but without the red crown patch. Wing, 5.00–5.30; tail, 3.50–3.90; culmen, .95–1.25; tarsus, .90–.95.

This is the only species of the genus in which the female has neither red nor yellow anywhere about the head or neck, and in which the lateral tail-feathers are banded for the greater part of their length, and the upper tail-coverts transversely barred.

Among thirteen adult males now before me I find considerable variation, which, however, affects chiefly the color of the nape, the exact shade of color pervading the head and lower parts, and the size and shape of the red crown-spot. In two specimens (76735, Fort Yuma, Dr. A. L. Heermann, and 49689, Camp Grant, Arizona, March 20, 1867, Dr. E. Palmer), the nape inclines very strongly to a light fulvous-buff, strikingly different in color from the occiput, sides of the crown, etc. Usually the nape is similar in tint to the breast, but of a decidedly darker shade, this being particularly the rule in fall specimens, in which the colors are darker and the texture of the feathers softer than in spring and summer. The exact tint varies greatly, however, the darkest example (No. 67153, Pueblo Viejo, New Mexico, September 19, 1873, C. J. Newberry), having the nape a deep sepia-drab, while in the lightest (No. 6129, Camp Yuma, California, A. Schott), it is a light ochraceous-buff, the lower parts being also much paler than usual. Summer specimens, having the plumage more worn and bleached than those killed in the fall or winter, are of course paler colored. The exact shape and extent of the red crown-patch vary greatly in different examples, but this may be owing in a great measure to the "make" of the skin.

## 8. CENTURUS HYPOPOLIUS.

*Picus hypopolius*, WAGL. Isis, 1829, 514.

*Zebrapicus hypopolius*, MALIN. Mém. Ac. Metz, 1848–9, 361; Mon. Pic. ii, 1862, 228; iv, pl. 103, figs. 4, 5 (♂ and ♀ ad.).

*Centurus hypopolius*, LICHT. Nomencl. 1854, 76.—REICH. Handb. 1854, 410, pl. 665, figs. 4413–14 (♂ & ♀ ad.).—LAWR. Bull. U. S. Nat. Mus. no. 4, 1876, 35 (Chapulco, Pueblo).

*Piczèbre alezan cendré*, MALIN. ll. c.

*Hab.*—Southern Mexico.

*Adult* ♂: Head, neck, and lower parts, back to flanks and anal region, deep smoky gray, or purplish drab, darkest on the head above, and nape; forehead, chin, and throat lighter, the first inclining to soiled white; eyelids surrounded by a blue-black circle, separated posteriorly by white on the upper eyelid; crown with a quadrate patch of crimson, and lower part of auriculars tinged with the same. Back and scapulars barred with glossy black and brownish white, wing-coverts and secondaries barred with purer white, the white bars broader on

the secondaries and outer greater coverts; primaries black (without white on outer webs, except at extreme base of the inner quills, and a very narrow edging to the outer quills), but each bordered terminally with white. Rump and upper tail-coverts white, marked longitudinally with black. Tail black, the inner webs of the *intermediae* partly white, this crossed by oblique bars of black; lateral tail-feathers barred at ends and on outer webs with white, the next pair with incomplete bars, at end only. Lower part of abdomen, anal region, flanks, and crissum, soiled white, the flanks transversely spotted, or irregularly barred with black, the crissum with irregular V-shaped marks of the same; anal region with smaller, nearly obsolete spots. *Adult* ♀: Similar to the ♂, but lacking the crimson crown-patch. Wing, 4.90–5.00; tail, 3.70; culmen, .85–.90; tarsus, .80. "Iris brown; bill blackish; feet ashy-blue." (SUMICHRAST, MS.)

This species is very peculiar in its coloration, and needs no comparison with any other. Its nearest ally is perhaps *C. elegans*, with which it agrees in the dark color of the breast and the black surrounding the eyes, although *C. uropygialis* is about equally related, in the uniform brown color of the nape, and the squarish crimson spot ornamenting the pileum of the male alone. It is a much smaller and decidedly more delicate species than either of those named, however, and differs widely in other characters of plumage. The absence of any red or yellow tinge on the abdomen, and the *longitudinal* markings of the rump and upper tail-coverts, which characterize this species, are unique features in this genus.

Of the single pair of specimens which I have been able to examine, the female (E. Mus. Salv.-Godm. "Mexico; ex Darmstadt Mus.") differs from the male (Mus. Salv.-Godm. "Valley of Mexico; H. S. Le Strange"), besides in the absence of the red coronal patch, in having much narrower and sparser streaks of black on the rump and upper tail-coverts, and in having the white spots on the outer greater wing-coverts larger, or even so nearly coalesced as to form a broken longitudinal patch.

## 9. CENTURUS ELEGANS.

*Picus elegans*, SWAINS. Philos. Mag. 1827, 439 (♂ ad.; "maritime land" of Mexico).—

LESS. Compl. Buff. ix, 1837, 318.—FINSCH, Abh. Nat. Brém. 1870, 356 (Mazatlan).

*Centurus elegans*, GRAY, Gen. B. ii, 1849, 442.—BONAP. Consp. i, 1850, 119; Consp.,

Zygod. 1854, no. 219.—REICH. Handb. 1854, 411.—SCL. Catal. 1862, 342, no. 2043

(Mexico); P. Z. S. 1864, 177 (city of Mexico).—SCL. & SALV. Nom. Neotr. 1873,

101 (Mexico).—LAWR. Mem. Boston Soc. ii, pt. iii, no. ii, 1874, 294 (Mazatlan,

Guadalajara, Tepic, and Sonora; habits).

*Zebrapicus elegans*, MALH. Mon. Pic. ii, 1862, 225; iv, 1862, pl. 102, figs. 5, 6 (♂: ♀ ad.).

*Pic-zèbre élégant*, MALH. II. c.

*Hab.*—Western Mexico.

*Adult* ♂: Crown and occiput scarlet-crimson; nape bright orange-yellow, sometimes abruptly defined against the red, often grading in-

sensibly into it; bare orbital space surrounded by black, this much broadest above the eye, where forming a large longitudinal patch, widest posteriorly, on each side of the red crown; remainder of the head smoky olive-gray, lighter on the forehead, the frontlet, cheeks, and chin more or less strongly washed with golden yellow; throat, jugulum, breast, sides, and upper part of abdomen, uniform smoky gray; middle of the abdomen stained, more or less deeply, with golden yellow; tibiae, anal region, and crissum thickly marked with V-shaped bars of black. Upper parts sharply, and rather broadly, barred with black and white, the bars of the two colors nearly equal in width; primaries black, bordered terminally with white, and marked at the base (of outer webs) with large blotches of the same; primary coverts uniform black; lower rump and upper tail-coverts white, with rather distant broad bars of black. Tail black, the *intermediae* broadly barred, on both webs, with white; lateral pair of rectrices distinctly barred on both webs, to the base, with white, the bars not touching the shaft, however, except near the end of the feather; next tail-feather usually barred on the inner web only, the next two wholly black or with mere indications of bars. *Adult* ♀: No red on the crown or occiput, which are uniform ash-gray, the occiput sometimes (but rarely) blackish, in consequence of the coalescence of the black supraocular patches. *Young* ♂: Similar to the adult, but colors of the head less brilliant, and all the markings of the plumage less sharply defined; light bars of the dorsal region obscured by an olivaceous wash. Wing, 4.50–4.90; tail, 3.10–3.60; culmen, .95–1.10; tarsus, .85–.90.

In this handsome species there is rather an unusual amount of individual variation. In the adult males, the bright Indian-yellow of the nape is usually quite distinctly defined against the red of the occiput and crown; but in one (No. 26991, Mazatlan), only the lower margin of the nape is yellow, the rest being bright red, like the occiput. In this example the frontlet, chin, cheeks, and auriculars are a bright golden yellow, while the jugulum and breast are darker and more olivaceous than in others. In the adult females the red of the crown and occiput is usually wholly replaced by uniform rather light brownish gray; but sometimes (as in No. 23817, Mazatlan, J. Xantus), the whole occiput is black, while it is not unfrequently spotted with this color. Furthermore, in this example, also in two others (Nos. 23752 and 39977, Mazatlan), the nape is intense orange-red with merely a lower border of yellow.

## 10. CENTURUS SUPERCILIARIS.

- Picus superciliaris*, TEMM. Pl. Col. iv, 1833, 433 (♂ ad.).—Cuv. Règ. An. ed. 1829, 451.—WAGL. Isis, 1829, 515.—LESS. Traité. 1831, 227; Compl. Buff. ix, 1837, 324.—DRAP. Dict. Class. xiii. —, 506.—THEINEM. J. f. O. 1857, 153.  
*Colaptes superciliaris*, VIG. Zool. Jour. iii, 1827, 445.—D'ORB. La Sagra's Cuba, Ois. 1839, 146, pl. 23 (albinotic ♀ ad.).  
*Colaptes superciliosus*, GRAY, Gen. B. ii, 1849, 446.

*Centurus superciliaris*, BONAP. Consp. i, 1850, 118; Consp. Zygod. 1854, no. 214.—REICH. Handb. 1854, 403, pl. 632, figs. 4400 (♂ ad.) 4401 (albinotic ♀ ad.).—GUNDL. J. f. O. 1856, 103; Repert. i, 1866, 294.—SCL. Catal. 1862, 342, no. 2042 (Cuba).—SCL. & SALV. Nom. Neotr. 1873, 101 (Cuba).

*Zebrapicus superciliaris*, MALH. Mem. Ac. Metz, 1848-9, 361; Mon. Pic. ii, 1862, 223; iv, 1862, pl. 102, figs. 1 (♂ ad.), 2 (♀ ad.), 3 (♀ ad., alb.).

"*Picus subocularis*, LESS, Discr. d'Ois. réc. découv. 1847, p. 205, no. 33, le mâle". (*Malherbe*.)

*Pic sourcil noir*, TEMM. l. c.

*Pic à sourcils noirs*, LESS. l. c.

*Colaptes à sourcils noirs*, D'ORB. l. c.

*Le Pic à plaque noire*, LESS. Descr. d'Ois. réc. déc.

*Carpintero jabado* } VULG.  
*Carpintero comun* }

*Le Piczèbre sourcil noir ou superciliare* } MALH. ll. c.  
*Pic-zèbre superciliare* }

*Hab.*—Cuba.

*Adult* ♂: Crown, occiput, and nape bright scarlet-crimson, darker anteriorly; frontal feathers, on each side of the base of the culmen, reddish (usually deeply red, occasionally merely stained with this color); a large longitudinal patch of black on each side of the crimson crown, the lower edge bordering the bare orbital space, and extending from the anterior angle of the eye back as far as the occiput; remainder of the head dull whitish, including a distinct and usually broad band across the forehead; white purest on auriculars and forehead, more tinged with light buffy-gray on the throat, this changing gradually to a deeper shade of the same on jugulum, the breast, sides, and abdomen deeply buffy drab, tinged with golden buff posteriorly; middle of the abdomen bright red; flanks, tibiae, anal region, and crissum varied with V-shaped marks of black. Back, scapulars, and wings broadly barred with black and white, the dorsal region strongly washed with buff yellow; rump and upper tail-coverts white, often tinged with pink and buff yellow, the former with transverse bars, the latter with V-shaped marks of black; tail black, the inner webs of the *intermediae* white, with broad, rather oblique, bars of black, the outer webs with a longitudinal stripe of white, narrow and pointed posteriorly, often barred with black anteriorly; lateral pair of rectrices marked with broad bars, or transverse spots, of white, not touching the shaft except the terminal and (rarely) the sub-terminal spots; inner webs with one or two broad bars of white near the end. Primaries black, the outer webs blotched with white near the base. *Adult* ♀: Similar to the ♂, but anterior part of the crown white, like the forehead, the occiput and posterior part of the crown black, this confluent with the black superciliary patches; bill blackish; feet olivaceous dusky. Wing, 5.40-6.00; tail, 4.50-1.80; culmen, 1.30-1.65; tarsus, 1.00-1.10.

The unique characters of this very distinct species consist in the large size (largest in the genus), superciliary black patches combined with



scarlet nape and red frontlet; equal width of the light and dark bars of the upper surface (in this respect most resembling *C. carolinus*), and the distinct buff-yellow wash which pervades the dorsal region.

## 11. CENTURUS STRIATUS.

*Picus dominicensis striatus*, BRISS. Orn. iv, 1760, 65, pl. iv, fig. 1 (♂ ad.).

*Picus dominicensis striatus minor*, BRISS. t. c. 67, pl. iii, fig. 2 (♀ ad.).

*Picus striatus* MÜLL. S. N. Suppl. 1776.—BODD. Tabl. P. E. 1783 (ex Pl. Enl. 281, 614).—GMEL. S. N. i, 1788, 427.—LATH. Ind. Orn. i, 1790, 238.—VALENC. Dict. Sc. Nat. xl, —, 173 (♀).—VIEILL. Ois. Am. Sept. ii, 1807, pl. 114 (♂ ad.); Nouv. Dict. xxvi, 1818, 90; Enc. Méth. 1823, 1316.—CUV. Règ. An. i, 1829, 451.—DRAP. Dict. Class. xiii, —, 505.—WAGL. Syst. Av. 1827, no. 40 (♂ & ♀).—LESS. Traité, 1831, 227; Compl. Buff. ix, 1837, 324.—BRYANT, Pr. Boston Soc. xi, 1863, 96 (St. Domingo).

*Centurus striatus*, GRAY, Gen. B. ii, 1849, 442.—BP. Consp. i, 1850, 119 (♀); Consp. Zygod. 1854, no. 216.—REICH. Handb. 1854, 409, pl. delxiii, figs. 4404-5 (♀).—SCL. & SALV. Nom. Neotr. 1873, 100 (Hayti).

*Zebrapicus striatus*, MALH. Mon. Pic. ii, 1862, 231; iv. pl. cviii, figs. 3, 4, 5 (♂ & ♀ ad.).

*Le Pic rayé de St. Dominique*, BRISS. Orn. iv, 1760, 65, pl. 4, fig. 1 (♂ ad.).

*Le petit Pic rayé de St. Dominique*, BRISS. t. c. 67, pl. 3, fig. 2 (♀ ad.).

*Pic rayé de St. Dominique*, BUFF. Pl. Enl. 281 (♂ ad.).

*Pic rayé à tête noir de St. Dominique*, BUFF. Pl. Enl. 614 (♀ ad.).

*Le Pic rayé*, VIEILL. l. c.—VALENC. l. c.—LESS. l. c.

*Pic-zèbre rayé ou de Saint-Dominique*, MALH. l. c.

*Hab.*—Island of St. Domingo or Hayti, only.

*Adult ♂*: Crown, occiput, nape, lower part of rump, and upper tail-coverts deep blood-red or scarlet-crimson, the red of the nape extending over the sides of the neck to a point immediately behind the auriculars; sides of the neck below this with two longitudinal stripes of dingy white, separated by a black one of about equal width; the posterior white stripes of opposite sides separated by a black space on the extreme lower part of the nape. Remainder of the head, smoky gray, gradually becoming smoky drab or brown on the jugulum and breast, this in turn passing gradually into light yellowish olive-green on the abdomen, anal region, crissum, sides, and flanks, all of which are immaculate.\* Back, scapulars, and upper part of rump sharply banded with deep black and bright yellowish olive-green, the black bars broadest, except on the rump. Wings black, the coverts banded with greenish buff, the secondaries with golden buff; outer webs of primaries spotted with pale buff. Tail uniform black, the lower surface dull hoary olivaceous. Bill plumbeous-dusky, the mandible paler (probably bluish white in life); feet olivaceous or plumbeous. ♀: Similar, but crown deep black, the red of the head and neck being confined to lower part of occiput and upper half of nape. Wing, 4.30–5.20; tail, 3.35–4.10; culmen, 1.00–1.30; tarsus, .90–1.00.

This is the only *Centurus* having red on the rump or upper tail-coverts,

\* In some examples the lower tail-coverts have indistinct dusky shaft-streaks.



and the only one, excepting *C. hypopolius*, without a decided red or yellow wash on the middle of the abdomen. In the bright yellow-green color of the lighter bars of the mantle, and in the longitudinal black and white stripes of the lower hind-neck, it is entirely peculiar in the genus; but in all the essentials of form, as well as the general style of coloration, it is a true *Centurus*.

## APPENDIX.

In addition to the species given in the above synopsis, Malherbe, in his *Monographie des Picidées* (ii, 1862), gives, besides *Melanerpes pucherani*, which he includes in this genus, two additional species of "*Zebrapicus*," viz: "*Z. gerinii* (Temm.);" and "*Z. aurocapillus* (Vig.)." They may or may not belong to the genus *Centurus*, in the restricted sense; and since I know nothing of either from autoptical acquaintance, I transcribe below Malherbe's account of each in full, as embodying all that is known regarding these doubtful species.

## ZEBRAPICUS GERINII (Temm.).

*Picus varius indicus*; GÉRIN, *Ornith.*, ii, p. 48, pl. 171.

*Picus carolinus*, VAR. D; LATH., *Ind orn.*, i, p. 231, spec. 18.

*Picus gerinii*; TEMM., pl. color., 73<sup>e</sup> livr., article du *P. superciliaris*.

MAS ADUL.—Albo nigroque supra variolosus; pileo, nuchâ abdomineque coccineis; fronte colloque subtus flavo-griseis, lineâ nigrâ a naribus per oculos ad humeros utrinque ductâ; tergo et uropygio ferè totis albis; remigibus rectricibusque nigris

## LE PICZÈBRE DE GÉRIN.

"Cette espèce, que nous ne connaissons que par la description qu'en donne Gérin et que reproduit Latham, tout en faisant une variété du *Zebrapicus carolinus*, m'aurait paru être le Piczèbre capistraté de M. Lichtenstein, si Gérin n'annonçait pas qu'une *bande noire descend des narines jusqu'aux épaules, en passant sur les yeux*. Ce caractère rapproche donc ce Piczèbre de *l'elegans* de Swainson, du *superciliaris*, de *l'hypopolius* et de mon *pucherani*, qui, tous, ont les yeux entourés de noir.

"M. Temminck nomme seulement ce grimpeur dans son article sur le *superciliaris* (pl. col. 433); mais il paraît ne l'avoir jamais observé et ne le connaître que par la description de Gérin.

"Nous n'avons aucun renseignement sur *l'habitat* précis de cet oiseau américain.

"*Coloration*.—*Le male*, d'après Gérin et Latham, a les parties supérieures rayées transversalement de noir et de blanc; le dessus de la tête, la nuque et le milieu de l'abdomen, sont rouges; le front et le dessous du cou sont d'un gris jaunâtre, une bande noire s'étend de chaque côte du cou, à partir des narines jusqu'aux épaules et en couvrant les yeux; les rémiges et les rectrices sont noires; le milieu du dos et le cropion sont presque entièrement blancs.

"*La femelle* n'a pas été décrite par les auteurs.

“*Habite l’Amérique, sans pouvoir indiquer dans quelle contrée, probablement le Mexique ou l’Amérique centrale.*”

“*Dimensions.*—Gérin et Latham n’ont indiqué les dimensions même approximatives de cette espèce, qui semble se rapprocher pour la taille du *Zebrapicus carolinus*, puisque Latham en fait une variété.

“On ignore ce qu’est devenu l’exemplaire décrit par Gérin et Latham.”

### ZEBRAPICUS AUROCAPILLUS (Vig.).

*Picus aurocapillus*; VIG. *Proceed. Zool. Soc. Lond.*, 1832, p. 4.—LESS., *Compl. Buff.*, ix, p. 315.

*Picus aurocapillus*; GAY ex VIG., *Hist. fis. de Chile*, 1847; *Zool.* p. 373.

FÆMINA ? Supra ater, albo fasciatus maculatusque; striga lata supra oculos ad humeros extendente, alteraque suboculare interrupta, gulæque albis; pectore abdomineque sordide albescentibus, strigis parvis fuscis notatis; capite atro; fronte aureo strigatim notato, vertice aureo.

### LE PICZÈBRE A TÊTE DORÉE.

*Pic a tête dorée*; LESS., *Compl. Buff.*, ix, p. 315.

“Cette espèce, du Mexique, ne nous est connue que par la description qu’en donne M. Vigors dans les *Proceedings of the Zoological Society of London*, et je ne l’ai observée dans aucune collection d’Europe. Je dois ajouter que je ne suis pas même certain, quoique cela soit probable, que cette espèce appartienne au groupe dans lequel j’ai cru devoir la faire figurer, en égard à sa coloration, la description de l’auteur anglais étant très sommaire. Ce grimpeur est plus petit que notre *Z. pucherani*, dont il diffère surtout par l’absence de rouge sur la tête et sur l’abdomen.

“Je suis très-porté à croire que le sujet décrit par M. Vigors était une femelle, et que l’espèce ne se trouve point au Chili, comme en doute aussi M. Gay, tout en la décrivant d’après Vigors.

“*La femelle ?* Corps noir au-dessus, tacheté et rayé transversalement de blanc; au-dessus des yeux, une large bandelette blanche qui s’étend jusqu’aux épaules, et une seconde interrompue, de même couleur, sous les yeux; la gorge est aussi de cette dernière couleur; le thorax et le ventre sont d’un blanchâtre sale avec quelques stries brunes; la tête est noire avec des rayures jaunes sur le front, et le sommet de la tête jaune d’or.

“*Habite le Mexique.*”

“*Dimensions.*—Longueur totale, 165 millimètres (les autres dimensions ne sont pas indiquées).

“Cette espèce figurait dans la collection de M. Cuming, que je n’ai malheureusement pu examiner, et ce dernier l’avait reçue du Mexique.”

SMITHSONIAN INSTITUTE,

January, 1881.

OBSERVATIONS ON *SIREDON LICHENOIDES*.

By WM. E. CARLIN.

Como Lake is a body of water about two miles and a half in circumference. It has no known outlet, but is fed by a stream of pure spring water about 2 feet wide and a foot deep, which, continually running, prevents the lake's absorption by evaporation. The lake is quite shallow and can be easily waded at almost any part, being not more than 10 feet deep in the deepest place that I have been able to find. The bottom of the lake is soft and is covered in most places with grass and weeds. The water is strongly impregnated with alkali, and a large number of cattle are said to have died a number of years ago from drinking it. It is very disagreeable to the taste. The amount of water varies about 14 inches during the year, being highest in the spring from the melting snows, and lowest in the autumn. This is the home of the *Siredon lichenoides* (Baird). They never enter the stream of fresh water, preferring the alkali water of the lake. They seem to suffer no inconvenience, however, if placed in fresh water. I have caught as many as a hundred and fifty and placed them in a cauf, and have never had one die from the change. The change to fresh water undoubtedly hastens the metamorphosis into the *Amblystoma* form, as I have noticed quite a change in the course of twenty-four hours in individuals placed in the cauf, while an equal number kept in the alkali water in the boat have shown no change in any of them in several days. I have kept six at different times in jars of fresh water until they have completed their metamorphosis. I made no systematic note of appearance from day to day, but my observation was careful and regular. In two cases the change in external appearance was so abrupt that I would have been almost certain that another salamander had been substituted for the one in the jar had I not had him so completely under observation that it was impossible. The gills had assumed a stubby form about half the length that they were the night before, and the gill on the back of the body was nearly half gone; it took air quite often, and I removed it from the jar and placed it in a box with some lake grass around it to keep it moist. It completed the metamorphosis in a few days. I did not feed it any during this time. While it was in the jar it was well fed with flies. The jar was placed upon a table in the telegraph office. The flies at first had to be pushed in front of it with a pencil. It finally got to know that tapping the jar with a pencil meant a fly, and would rise to the surface immediately and snap at whichever it saw first, pencil or fly. It furnished train-men continual amusement while here, and they kept it constantly gorged. Those that I kept well fed in jars and seldom changed the water, say once in three days, usually began to show a slight change in from two to three weeks,

and all of them completed the change into the *Amblystoma* inside of six weeks, while I have had but three changes of those kept in the cauf (sixty of them) in three months. During that time they have not been fed at all. The *Siredon mexicanus* is said to never undergo the transformation in its home, and Professor Marsh doubts that it ever makes it here. This doubt I can put at rest. They do make the change here, and in large numbers. During the latter part of the month of July and the entire month of August, if the day is rainy or misty, they come from the lake in to the shore in large numbers, and secrete themselves under some piece of wood or rock where they can keep moist. Sometimes they venture out in a shower, and the sun catches them before they can obtain shelter either in the lake or under cover, and in a few minutes kills them. They can be found dried hard anywhere about the lake, on the shore or in the grass. While catching *Siredon* I have seen and caught a number of *Amblystoma* in the lake, with the metamorphosis, as far as I could see, as complete as those we find half a mile from the lake. They cover the ground by thousands during a warm summer rain, coming from every conceivable place where they could have found shelter, from under rocks, boards, old ties, and out of gopher holes. I have a cat that eats them greedily. She has fished several out of jars on the table and devoured them during the night when there was no one to watch her; and I am told by a resident that the numerous skunks that live around the lake live principally on them. They are of two colors, a blackish green and a yellowish green color. I have had two of the blackish green complete the change in sequence, while one of the yellowish green was completing it under the same circumstances of change of water and food. I think this will be found to be the result in all similar cases. I have caught them in all stages of growth and in all stages of their changes into the *Amblystoma* state. During the months of July and August they lie close to the shore of the lake, where it is shallow; but after the first frost they disappear completely, or at least I have never been able to find them. I think they must bury themselves in the mud at the bottom of the lake, as I have stirred up the grass often and have not seen them issue from it.

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**ON THE DESTRUCTION OF FISH BY POISONOUS WATER IN THE GULF OF MEXICO.**

**By JOSEPH Y. PORTER, Assistant Surgeon, U. S. A.**

UNITED STATES ARMY HOSPITAL,  
OFFICE OF POST SURGEON, KEY WEST BARRACKS, FLA.,

January 21, 1879.

PROFESSOR: I forward you to-day by express a small box containing a quart of Gulf water, procured 20 miles from this port. I enclose you a slip of paper taken from the "Key of the Gulf," a local of this place, which in its turn clipped it from the "Forest and Stream." It seems to be



the general opinion in this section among non-scientific men that the destruction of fish has been due to the saturated condition of the water with dogwood (*Cornus Florida*). I am informed that the shores of Lake Okheechobee abound in this vegetation, as well as the country around it; and as the land was completely overflowed last year—summer—some couple of hundred miles in that vicinity, water 4 and 5 feet deep, it is thought, as it remained some little while before running off, that some of the properties of the *Cornus* may have been imparted to the water, and this in its turn contaminated the Gulf water. However, this is a mere conjecture, and may not be any nearer the truth than a theory advanced by a "Partington" of this place, viz, that the fatality of the fish was due to a *vulgar corruption* (volcanic eruption) of the Everglades. The fishermen have suffered terribly in consequence of this calamity, returning to port trip after trip with their "wells" full of dead fish. They say that they meet with good success in catching the fish above Pine Island, Charlotte Harbor, and are able to keep them alive until returning, preparatory to going to the Havana market. They meet with this belt of poisoned water between this port and Punta Russa, and immediately on entering or attempting to cross it their fish come to the surface, gasp, and die.

I trust that as soon as the water I sent you shall be analyzed you may be pleased to inform me; for which favor I shall be deeply grateful.

I am, Professor, very respectfully, your obedient servant,  
JOSEPH Y. PORTER,

*Assistant Surgeon U. S. A., Post Surgeon.*

Prof. SPENCER F. BAIRD,  
*Washington, D. C.*

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#### THE FISH MORTALITY IN THE GULF.

JACKSONVILLE, FLA., *December 26, 1878.*

EDITOR FOREST AND STREAM:

In reply to your communication soliciting information regarding the mortality among the fish on the coast and ocean near the Keys, I can only say that from personal observation I have none to communicate. Through the public press I have noticed that fish have been dying in immense quantities for some time.

By some the mortality is attributed to the freshness of the water as a consequence of the heavy rains of the past summer and autumn. But in my opinion this explanation will not suffice, as the main outlets of the Okheechobee empty into the ocean north of Pavillion Key, and that sheephead, tarpon, channel bass, and mullet visit and live in brackish and even fresh water. By some it has been attributed to volcanic action, and by others to the breaking forth of a subterranean stream, the waters of which are poisonous. One fact is positively known, and that is that fish in enormous quantities are dying over a large extent of the



Gulf from the effects of something contained in the water—be that something deleterious gases, mineral substances held in solution, or fungi.

The fishing interest of Key West is an important one, for it supplies thousands with the means of subsistence, and if the fish mortality should continue it will bring privation and suffering to many a family.

It appears to me that the existing mortality among the fish is a matter of scientific importance, and should be thoroughly investigated. I would suggest the advisability of the Revenue Department or the Smithsonian Institution sending a commissioner to investigate the cause of the mortality. The government has a dispatch boat at Key West which could be spared for the purpose, and the expense would be trifling. As a matter of scientific interest, independent of its commercial importance, this subject demands investigation.

I remain yours, truly,

C. J. KENWORTHY.

We warmly second Dr. Kenworthy's suggestion, and hope the government will permit the use of facilities for investigation which it appears to have in readiness at Key West. We have already hinted that the use of fluoresceine in those waters of Florida which empty into the Gulf might serve to indicate the origin of the boiling spring, whose discovery somewhere off the Gulf coast was announced two months ago. If such a volcanic spring exists, the poisoning of the water can easily be accounted for; though the remedy to prevent continued mortality of the fish is not so readily found. The locality of this boiling spring was given by the Key West Key of the Gulf, of November 6, or thereabouts, as "along our bay coast from two to ten fathoms out." This is not very definite, but it is the most positive designation that we have seen. No authentic information seems to have been derived from any other source. The fishermen whose occupation has been cut short so suddenly should devote their leisure time to efforts to determine the locality of the obnoxious cause, wherever or whatever it is, and report at once to the revenue station at Key West, thereby seconding the efforts of the government to remedy the evil. It will be a direct way of putting bread in the mouths of their now starving families. The polluting substance, whatever it may be, is evidently most subtle, for its influence is seen for a distance of 200 miles, dead fish covering the surface of the ocean wherever the eye rests. One proof of its volcanic origin is that the water so polluted is of a "red brick color," at a distance of less than a mile from the shore, while the interval of water along the land is natural in color and taste. Of its subaqueous origin there can be no doubt, but whether it has connection with waters in the interior of Florida by subterranean passages, or has a deeper and independent source and seat, is what we wish to know. The phenomenon in itself is not wonderful or incomprehensible, being only a reproduction of boiling springs in all parts of the globe, both in land and ocean. Off Matanzas there is an immense spring, not hot, but of clear, cold, pure water.—*Forest and Stream.*

## AN ANALYSIS OF WATER DESTRUCTIVE TO FISH IN THE GULF OF MEXICO.

By F. M. ENDLICH.

SMITHSONIAN INSTITUTION,  
Washington, D. C., April 5, 1879.

SIR: Having completed the examination of sea-waters from the Gulf of Mexico, so far as the scant supply would permit, I have the honor to offer the following report thereupon, the water in which the fish die being designated as A, the good water as B:

	A.	B.
Specific gravity .....	1.024	1.022
Solid constituents (total), per cent.....	4.0780	4.1095
Ferrie compounds, per cent.....	0.1106	0.0724
Injurious organic matter .....	ratio=3	ratio=2

I find that the water A contains a large quantity of *Algae* and *infusoria*. It is eminently probable that the former may have had an injurious effect upon the fish. Specimens of the *algæ* have been submitted to Professor Goode, who will send them to some expert, in order that their specific character may be determined.

The "dead fish" in possession of the United States National Museum are such that any examination of the organs of respiration will be of no avail.

I cannot find, even by spectroscopic analysis, any mineral constituents in the water A which could noxiously affect the fish.

In my estimation the death of fish was caused by the more or less parasitic *algæ*, which are found in large quantities in water A, but do not occur at all in water B.

In case the same phenomenon should recur, the presence of an expert in the questions involved, more particularly chemistry and botany, would most likely lead to definite results.

Respectfully,

F. M. ENDLICH.

Prof. S. F. BAIRD,

*Secretary Smithsonian Institution,**Washington, D. C.*

## FISH MORTALITY IN THE GULF OF MEXICO.

By M. A. MOORE.

BRAIDENTOWN P. O., MANATEE COUNTY, FLORIDA,

November 30, 1880.

SIR: I hope you will excuse the liberty I take in writing you this letter, but on yesterday Maj. W. I. Turner gave me a blank circular of yours and asked me to fill out the queries for him, which I did, and thought no more of it at the time. But on thinking the matter over I have come to the conclusion that there is a matter here that might be of some interest to your commission, as it is one of most vital importance to many here.

You are doubtless aware that we have employed here a number of vessels as fishing-smacks, ranging from 30 to 50 tons, whose vocation it is to carry live fish to the Cuban markets. This industry provides occupation and subsistence for a large portion of our population in South Florida.

About two years ago certain portions of our Gulf waters became poisoned in some way that caused the death of all the fish that came in contact with it. Whenever a smack with a full fare, *i. e.*, a full cargo of fine healthy fish in her well, sailed into this poisoned water every fish would die, and they would have to be thrown away. This compelled the vessel to return to fishing, at the loss of a month's hard work.

This state of affairs has occurred again; the waters of some portions of the Gulf becoming so noxious as to kill the fish. The poison seems to be confined to certain localities and currents for the time being, as sometimes this state of affairs is observed more marked at one place and sometimes at another. However, there seems to be more of it about the mouth of Charlotte Harbor and off Punta Rassa than elsewhere.

When this condition of water prevails, the surface of the water is covered with dead fish, and the beach is covered with them in such numbers that sometimes the stench is intolerable. During its prevalence two years ago the military commander at Fort Jefferson on the Tortugas had to make daily details to carry off the dead fish thrown up on the beach for fear it would breed a pestilence.

I live immediately on the beach of Palma Sola Bay, and some two weeks ago the beach was covered with dead fish. The only thing that seems to be inexplicable is that this water seems to affect what are termed here bottom-fish more than any others. The principal game of the fishing-smack are the grouper (*Serranus nigrilis*), and the snapper (*Serranus erythrogaster*). These, with the perch, king-fish, trout, and all those fish which take the hooks seem to be much more affected than the mullet (*Mugil lineatus*), or the pompano (*Bothrolæmus pampanus*). In our parlance here fish that take the hook are called bottom-fish in contra-

distinction from those that go in schools and are taken with the net, and the bottom-fish seem to be more affected by this water than the others. Numbers of sharks and rays, eels and catfish are thrown up dead on the beach.

I am not aware that there has been any report of this matter made to your commission, or any attempt made at the analysis of the water, and would not have taken the liberty of writing, save for the fact that the greater part of our fishermen are comparatively illiterate. My own opinion is that the state and condition of the water are caused by some volcanic action at the bottom. I may be wrong in my technical names of the fish, but our fish have never been properly classified, and I give you the best I can do.

With a renewed apology for the liberty I have taken, I remain, most respectfully,

M. A. MOORE.

Professor BAIRD,

*Commissioner of Fish and Fisheries, Washington, D. C.*

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**ON THE DESTRUCTION OF FISH BY POLLUTED WATERS IN THE GULF OF MEXICO.**

**By W. C. W. GLAZIER, Assistant Surgeon, M. H. S.**

TREASURY DEPARTMENT,  
OFFICE SUPERVISING SURGEON-GENERAL  
UNITED STATES MARINE HOSPITAL SERVICE,  
*Washington, D. C., December 7, 1880.*

SIR: I have the honor to transmit herewith copy of a letter received on the 3d instant from Assistant Surgeon W. C. W. Glazier, of this service, now on duty at Key West, which it was thought might be of interest to you.

Very respectfully,

JOHN B. HAMILTON,  
*Surgeon-General U. S. Marine Hospital Service.*

Prof. S. F. BAIRD,

*Commissioner of Fish and Fisheries, Washington, D. C.*

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UNITED STATES MARINE HOSPITAL SERVICE,  
DISTRICT OF THE GULF, PORT OF KEY WEST, FLA.,  
*Surgeon's Office, November 25, 1880.*

SIR: I have the honor to report, as a matter of scientific interest, that it has occurred several times that fishermen returning from the coast of Florida with fish, in an apartment of their boats communicating freely with the surrounding water, have had them die suddenly on reaching a certain kind of water distinguishable by its color. This has

occurred several times, notably about 1865 and in 1878, when large numbers were thrown on the shore at Key West, many of them of very large size, so that perhaps all that came within the influence of the poisoned water perished sooner or later.

There is nothing known as to the origin of the poisonous qualities of the waters that affect the fish in this way, but the prevalent opinion seems to be that there is something emptied into the beds of the fresh-water courses from volcanic or geyser-like springs, and that as soon as the water thus impregnated reaches the sea it kills every living thing that comes under its influence.

It has been reported that several smacks have lost their cargoes within the last two weeks, and that the waters of Tampa, Sarasota, and Charlotte Harbor were covered with thousands of dead fish, and that the stench was so great that the vessels were obliged to keep free from them.

Very respectfully,

W. C. W. GLAZIER,  
*Assistant Surgeon, M. H. S.*

The SURGEON-GENERAL U. S. MARINE HOSPITAL SERVICE,  
*Washington, D. C.*

#### NOTES ON SOME FISHES FROM HUDSON'S BAY.

By TARLETON H. BEAN.

Two small collections of fishes collected in the Hudson's Bay region, and received by the United States National Museum in 1880, are worthy of note, because fishes from that quarter are rarely added to museums in the United States, and consequently our knowledge of the fauna is limited.

One of these lots embraces the following four species, presented by Walton Hayden, esq., from Moose Factory. The numbers at the left of the name of the species refer to the Museum Fish Catalogue.

27782. *PERCOPSIS GUTTATUS* Ag.

The dorsal has 9 to 11 developed rays; the anal i, 7; ventral 8; scales in lateral line 47 to 48. Seven specimens were obtained.

27783. *STIZOSTETHIUM VITREUM* (Mitch.) Jord. & Copeland.

Two young examples about  $3\frac{1}{2}$  inches long.

27784. *ACIPENSER MACULOSUS* LeS.

A young individual  $4\frac{1}{2}$  inches long.

27785. *URANIDEA SPILOTA* Cope.

One specimen measuring 4 inches without the tail, which is wanting. Vomerine teeth only. D. ix, 18; A. 12; V. i, 4.

From Robert Bell, M. D., Assistant Director of the Geological Survey of Canada, have just come the following six species, all of them collected at the mouth of Nelson River except *Cottus labradoricus*, which is from



near York Factory. As the last species has figured among the doubtful ones in our lists of East Coast fishes, I give a somewhat detailed description of it.

27776. *PERCOPSIS GUTTATUS* Ag.

27777. *STIZOSTETHIUM VITREUM*? = (*Lucioperca americana* Cuv.)

The example is very young and entirely without scales, but the species is most probably *vitreum*.

27778. *GASTEROSTEUS PUNGITIUS* L. = (*Pygosteus occidentalis* [C. & V.] Brev.).

This is the form described as *G. nebulosus* by Agassiz. It does not differ from marine *pungitius* except in its fresh-water habits.

27779. *GASTEROSTEUS ACULEATUS* var. *GYMNURUS* Cuv.

The few scaly plates on the anterior part of the body are present, but rudimentary.

27780. *COTTUS LABRADORICUS* (Girard).

Taken near York Factory, Hudson's Bay, by Robert Bell, M. D., Assistant Director of the Geological Survey of Canada, 1880.

Br. vi; D. X, 14; A. 14; V. i, 3; P. 17; C. 11 (developed).

Two small spines above the snout; a rough irregular prominence above each orbit and two similar ones on the occiput. The slight depression on the crown becomes narrower posteriorly where its width is about one-half the length of the space included between the supraorbital and occipital prominences. *Four preopercular spines*, two of which are at the angle; the uppermost and longest is two-thirds as long as the eye, but the spine is slightly imperfect; the two lower spines are short and extend downward and slightly forward. The length of the longest preopercular spine equals the distance between the eyes measured on the bone. The long diameter of the eye is one-fifth of the length of the side of the head, and nearly equal to the length of the snout. The maxilla is twice as long as the eye, about half as long as the head to the end of the opercular spine, and extends to about the vertical through the hind margin of the eye. Teeth on the vomer, none on the palatines. The dorsal spines are slender; the first is twice as long as the distance between the eyes; the third and longest is five-sixths as long as the maxilla and one-half as long as the distance from the tip of the snout to the end of the occipital prominences. The length of the spinous dorsal base is one-fourth of the total length without caudal. The interval between the spinous and soft dorsals is one-half as long as the eye. The longest ray of the soft dorsal (9th) is about as long as the middle caudal rays, or one-sixth of the total length with caudal. The pectorals reach a little beyond the origin of the anal (to the second ray of the anal); the ventrals are as long as the postorbital part of the head and do not reach near the vent. Skin above the lateral line

with a few spiny tubercles, none of them more than one-fourth as long as the eye. The specimen sent is a dried individual and its colors cannot be made out. There is a small slit behind the fourth gill. The local name at York Factory is "Miller's Thumb," according to Dr. Bell.

27781. *COREGONUS ARTEDI* LeS. var.

The species agrees in all respects with typical *Artedi* from the Great Lakes with the exception of its smaller eye. Two larger examples collected at Moose Factory many years ago also have the eye notably smaller than in *C. Artedi*. The local name at York Factory, says Dr. Bell, is "*tulibi*." It must not be inferred, however, that the species is at all like *Coregonus tullibeei*, for it is not closely related to this form. Specimens in alcohol are much desired.

U. S. NATIONAL MUSEUM,  
Washington, D. C., March 28, 1881.

ON THE MINERALOGICAL COMPOSITION OF THE NORMAL MESOZOIC DIABASE UPON THE ATLANTIC BORDER.

By GEORGE W. HAWES, Ph. D.

In my opinion the Mesozoic "trap rocks" have excited more interest and received more lithological attention than any other defined rock species upon the Atlantic border. There is, therefore, no rock concerning the geological features and chemical composition of which we are so well informed; but much as it has been discussed, the mineralogical composition has, in part, remained a matter of speculation rather than of definite knowledge. As our methods for determining such points are now much more satisfactory, I think that the final determination of the mineral composition of the normal variety of this rock may be accomplished, and this will be of much interest on account of the wide distribution and the uniform character of these diabases.

I will give a few references to show the development of our knowledge of these rocks and the essential uniformity in their composition.

When Perceval wrote, no attempt was made to determine their composition, and their geological features and distribution were chiefly considered.<sup>1</sup>

Prof. J. D. Dana has at different times pointed out the wonderful uniformity of these rocks wherever they occur, intersecting the Mesozoic sandstones on the Atlantic border.<sup>2</sup> He quotes specific gravity determinations by Professor Brush of New Haven, Professor Cooke of New Jersey, Professor Kerr of Raleigh, N. C., and Professor Howe of Nova Scotia, made upon specimens from their respective localities, and

<sup>1</sup> See Dana's Geology, page 20.

<sup>2</sup> American Journal of Science, series iii, vol. vi, page 104.

which are essentially alike. Professor Dana considered these rocks as composed of pyroxene, magnetite, and labradorite.

Professor Howe<sup>1</sup> soon afterward made further determinations of specific gravity with the view of illustrating more fully the uniformity of this composition.

Chemical analyses of these rocks have been made by Prof. G. H. Cooke,<sup>2</sup> Prof. W. G. Mixer,<sup>3</sup> S. T. Tyson,<sup>3</sup> and Dr. F. A. Genth,<sup>4</sup> which are all nearly concordant, and show the ultimate composition to be always nearly the same.

The most extensive series of analyses has been made by myself<sup>5</sup> upon specimens taken from various points in the Connecticut Valley, and a specimen from Jersey City, which was intended to represent the Hudson palisades. These analyses demonstrated the essential uniformity of the composition, all variations being referable to the degree of hydration which represents the extent of the decomposition of the rocks, and the degree of alteration of its pyroxene to chlorite. I concluded that the feldspar was labradorite, but demonstrated that the large kernels in one variety were of anorthite.

Prof. E. S. Dana<sup>6</sup> began the microscopic examination of these rocks. He confirmed the determination that these rocks are composed of augite, triclinic feldspar, and an iron oxide, and assumed from my analysis that this feldspar was labradorite. Notwithstanding this, these rocks are stated to this day by Credner<sup>7</sup> to be diorites, that is, hornblendic rocks.

Mr. P. Frazer<sup>8</sup> has discussed my analysis of West Rock together with the analysis by Professor Genth. He assumed the feldspar to be a labradorite of normal composition, and calculated that labradorite and augite were present in equal proportion.

From these works it is then evident that the unaltered Mesozoic diorites are all very much alike, and are composed of augite, iron oxide, in the form of magnetite and titaniferous iron, and a feldspar that has been reasoned to be labradorite.<sup>9</sup> This latter determination is in need of verification.

The method employed by me for this determination was that proposed

<sup>1</sup> Philosophical Magazine, February, 1876.

<sup>2</sup> Geological Report, New Jersey, page 215.

<sup>3</sup> American Journal of Science, iii, vol. vi, page 105.

<sup>4</sup> 2d Geological Survey of Penna. report of progress in York and Adams counties, page 120.

<sup>5</sup> American Journal of Science, 1875, vol. ix, page 185.

<sup>6</sup> Proc. Am. Association Adv. Sci., Aug., 1874.

<sup>7</sup> Credner, Géologie, page 532. With his ill-defined definition of melaphyr, to which he refers a part of these rocks, they certainly have nothing to do. These rocks had long been demonstrated to be augitic when the last edition of his work appeared, which still states the palisades to be of diorite.

<sup>8</sup> 2d Geological Survey of Penna., vol. C, report of progress in the district of York and Adams counties.

<sup>9</sup> I speak now only of its essential original constituents. Biotite and hornblende

by Dr. Thoulet, which, though not invented by him, was brought into general notice by his more successful development of the method.<sup>1</sup>

In a solution of iodide of potassium, iodide of mercury was dissolved, and the sp. gr. of the resultant fluid was 3.18.<sup>2</sup> Some of the diabase from Jersey City, which is particularly fresh, was pulverized till all the grains would pass through coarse muslin. From this powder the dust was separated by washing in water, and the mass of uniformly fine grains was put into the fluid, when the iron oxide and augite sank to the bottom and only feldspar remained on the top. I diluted till the sp. gr. decreased to 3, when some grains of a compound character settled out, and the microscope indicated that the floating mineral was entirely of feldspar. I diluted and made the gravity 2.90, and nothing of consequence fell down, neither did any considerable portion settle from the mass till the sp. gr. had reached 2.69, when at this point the mass of feldspar, on being mixed with the fluid as before, separated into two parts with such facility as to plainly show that two minerals were present. Further experiments on the parts did not result in any further separations, and it was therefore decided to analyze these parts. These analyses were performed by Dr. A. B. Howe, of the Scientific School at New Haven, and were found to be composed as follows:

# FELDSPAR IN JERSEY CITY DIABASE.

Sp. Gr. over 2.69.			Sp. Gr. under 2.69.		
SiO <sub>2</sub> .....	52.84	.88	SiO <sub>2</sub> .....	60.54	1.01
Al <sub>2</sub> O <sub>3</sub> .....	18.62	.278	Al <sub>2</sub> O <sub>3</sub> .....	24.11	.234
Fe <sub>2</sub> O <sub>3</sub> .....	1.52	.009	Fe <sub>2</sub> O <sub>3</sub> .....	1.14	.007
CaO .....	11.81	.21	CaO .....	9.15	.163
MgO .....	.46	.01	MgO .....	.27	.107
Na <sub>2</sub> O .....	2.38	.038	Na <sub>2</sub> O .....	4.11	.066
K <sub>2</sub> O .....	.86	.009	K <sub>2</sub> O .....	1.06	.011
H <sub>2</sub> O .....	1.06		H <sub>2</sub> O .....	.59	
<hr/>			<hr/>		
99.55			100.97		
R O : R <sub>2</sub> O <sub>3</sub> : SiO <sub>2</sub>			R O : R <sub>2</sub> O <sub>3</sub> : SiO <sub>2</sub>		
1        1        3.3			1        96    4.09		
R <sub>2</sub> O : R O			R <sub>2</sub> O : R O.		
1.        4.7			1.        2.2		

It is therefore plain that the feldspathic element in this rock is not any single feldspar. One of the feldspars is very plainly labradorite, and the other has the ratio of andesite. The two feldspars were dis-

have been found in small amount in some specimens. Apatite is uniformly present as a minutely microscopic constituent, and the whole sequence of zeolites and chlorites-with quartz, calcite, and other minerals, are present as decomposition products, but as a rule it is a monotonously uniform mixture of the above three minerals.

<sup>1</sup>Thèses présentées à la faculté des sciences de Paris, pour obtenir le grad de docteur. Contributions à l'étude des propriétés physiques et chimiques des minéraux microscopiques. Par M. J. Thoulet.

<sup>2</sup>This result was obtained by uniting the proportions recommended by Victor Goldschmidt, Ueber Verwendbarkeit einer Kaliumquecksilberjodidlösung, &c. Inaugural Dissertation zu Heidelberg, Stuttgart, 1880.



tinguishable under the microscope, and the optical properties of the grains offered no peculiarities to conflict with the above determination.

The analysis of the anorthite and augite that I picked from West Rock may be added, and our knowledge of this diabase may be said to be quite complete as regards the composition of the fresh rock. I will place together the analyses of the rock and its other components. Professor Genth's analyses, to which I have referred, is more complete than any that I have made, since he determined the traces of lithia, copper, and sulphur. But his analysis was made on more hydrous material; therefore I will use my old analysis of West Rock, New Haven, because the analyzed material was very fresh, bright, and clear, and also illustrates the commonest variety of the rock.

This rock and the following minerals from it have been analyzed:

	West Rock, New Haven.*	Augite in West Rock.	Anorthite in West Rock.
SiO <sub>2</sub> .....	51.78	50.71	45.95
Al <sub>2</sub> O <sub>3</sub> .....	12.79	3.55	34.70
Fe <sub>2</sub> O <sub>3</sub> .....	3.59		.64
FeO .....	8.25	15.30	
MnO .....	.44	.81	15.82
CaO .....	10.70	13.35	Tr.
MgO .....	7.63	13.63	1.80
Na <sub>2</sub> O .....	2.14	} 1.48	.45
K <sub>2</sub> O .....	.39		
TiO <sub>2</sub> .....	1.41		
P <sub>2</sub> O <sub>5</sub> .....	.14		
Igniton.....	.63	1.17	.96
	99.89	100.00	100.32

\* My analysis with the titanic acid determinations by Dr. A. B. Howe, American Journal of Science, vol. ix, 1875, page 185.

Knowing that the feldspathic element is complex we can now calculate approximately the percentage composition upon the basis of the elements which are peculiar to the species involved. If in this manner neglecting the water we determine the percentage of the mineral constituents, we obtain

Anorthite, 15.52; albite, 22.16; potash feldspar, 2.32; augite, 54.47; titanic iron, 2.68; magnetite, 1.76; apatite, .32; total, 99.23.

The composition of this mixture, on adding again the water, would be as follows:

SiO <sub>2</sub> .....	51.78	Na <sub>2</sub> O .....	2.62
Al <sub>2</sub> O <sub>3</sub> .....	12.46	K <sub>2</sub> O .....	.39
Fe <sub>2</sub> O <sub>3</sub> .....	.92	TiO <sub>2</sub> .....	1.41
FeO .....	10.67	P <sub>2</sub> O <sub>5</sub> .....	.14
MnO .....	.44	H <sub>2</sub> O .....	.63
CaO .....	10.77		
MgO .....	7.63		
			99.86



This analysis differs from the one actually performed only in fractions of percentages in the alumina and soda, and I think may be assumed as being nearly correct. The amount of iron in the two analyses is identical, but there is some difference in the state of oxidation, which can readily be supposed to be the result of secondary actions that have taken place in the rock analyzed.

It becomes very easy now to see how extremely diversified the feldspathic element may be in rocks of this nature. The molecules may arrange themselves in very diversified ways, while the rocks remain identical in composition. Circumstances of cooling might cause anorthite to separate in a nearly pure condition, when there would be a compensating acidity in the remainder of the feldspathic element. This is a much more satisfactory explanation than that which I offered at the time I demonstrated the presence of anorthite in the West Rock diabase,<sup>1</sup> for as my analysis showed, the presence of the anorthite did not modify the ultimate composition of the rock. On the other hand pure anorthite might be entirely absent and its molecules might enter into combination with the molecules of the potassium and sodium feldspars, to form one or more intermediate species, as in the Jersey City diabase, and much diversity might exist in this feldspathic element in different localities without the slightest change taking place in the ultimate composition of the rock.

I regard this work as of some importance, since it completes our knowledge of the normal composition of a rock which has a great distribution and very uniform characters, and shows that this rock is more complex in composition than had been supposed. Besides it has been common to consider what feldspar enters into the composition of basic rocks like this, rather than what feldspars. An exquisite balance of composition and circumstance would be necessary to crystallize such a rock with a single feldspar, and we have reason to be convinced that massive rocks are rarely simple as regards their feldspathic constituent.<sup>2</sup>

It has also an important bearing upon the microscopic determination of feldspars by means of optical properties. The method proposed by Pumpelly, and further developed by Fouqué and Levy, is used for the determination of the species of feldspar by seeking for the greatest angles which elasticity planes make with twinning planes, in the zone with axis perpendicular to the twinning plane. There is of course a pos-

<sup>1</sup> Am. Jour. Sci. 1875, vol. ix, p. 189. I concluded that a minute change in the composition of the rock would be sufficient to allow of the formation of anorthite, which on account of its infusibility would first crystallize from the rock mass, as was evidently the case.

<sup>2</sup> Fouqué has demonstrated the complexity of the feldspar in Santorin andesites, *Santorin et ses Éruptions*, page 366.

I have examined the basic rocks at Peekskill, on the Hudson, recently described by Professor Dana, *American Journal of Science*, vol. xx, page 194. The feldspathic element was easily separated into two parts, one of which was a pink variety of andesite and the other white orthoclase.

sible chance in a section that no crystals should be intersected in a plane possessing the approximate maximum angle between the traces of the twinning plane and elasticity plane, and there is also a possibility that one might examine many sections with approximately equal angles of extinction to the right and the left of the twinning plane, as the method requires, without meeting such as possess an angle characteristic of the species, even were such present; hence the correct determination of the species by this method must remain to a certain degree a matter of chance. But when the feldspathic element is complex, a determination based upon this method would lead one to determine the whole of the feldspar as belonging to the species with the maximum angle of extinction. This method has been applied to a very considerable extent, but the considerations here advanced show that the method, although entirely correct in principle, and certainly of some value in lithological research, is not adapted to the final determination of the exact nature of the feldspathic constituent, and is likely to lead to erroneous conclusions.

All are familiar with the grand diversity of the secondary products that occur in these rocks, and which have enriched the mineral cabinets of the whole world. The contact, modifications, and structural features are none the less interesting; but it is not the intention to consider these questions here. It will be well to record the observation that they are sometimes so modified by quick cooling upon the exterior walls of the dikes in contact with the sandstones that they become cryptocrystalline, and contain long acicular feldspar crystals in a glassy ground mass, and in other microstructures resemble augite andesites. The occurrence of glass has not been heretofore noticed in these rocks. Excepting such local modifications the rocks are always like the ordinary old diabases, and even in microscopic features monotonously alike wherever fresh stones occur.

These rocks so characteristic of our Triassic are additionally interesting on account of the comparative absence of eruptive material intruded in the similar Triassic sandstones of Europe.

NATIONAL MUSEUM, *Washington, D. C., April 5, 1881.*

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#### ON THE DETERMINATION OF FELDSPAR IN THIN SECTIONS OF ROCKS.

By **GEORGE W. HAWES, Ph. D.**

In my recent article upon the composition of the diabases \* which intersect the Mesozoic red sandstones upon the Atlantic border, I suggested that the complexity of the feldspathic element in basic rocks is probably much greater than is commonly supposed, and that this complexity is liable to cause a serious error if the method of determination

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\* This volume, page 129.

by means of the measurement of the maximum angle between the twinning plane and the elasticity planes in thin sections cut in the zone with its axis perpendicular to the twinning is followed.

I wish also by means of an analysis to draw attention to the circumstance, that the absence of a twinning plane parallel to the brachypinacoid is by no means rare, and this is a circumstance bearing upon the same point and demanding recognition in lithological work.

At the St. Paul Island, Labrador, from whence the beautiful *striated* labradorite specimens are obtained, there are also found large pieces of feldspar with beautiful broad basal cleavage planes, which show no trace of striation, and basal sections of which in polarized light under the microscope show no trace of twinned structure.

A piece of this feldspar in the cabinet of Professor Brush, at New Haven, is of a bluish-gray color, its basal cleavage is much more perfect than is usually the case with labradorite, and its cleavage parallel to the clinopinacoid is very much poorer than usual. It only shows in the latter direction a conchoidal vitreous fracture, with mere traces of cleavage. Its dark color is imparted to it by a multitude of minute black needles, the larger of which are inlaid parallel to the vertical axis of the crystal. The intersection of an elasticity plane and the base is inclined  $5^\circ$  to the edge between the basal and brachypinacoidal cleavages, while the intersection of the plane of the optic axes and the brachypinacoid is inclined  $17^\circ$  to the same edge, and both inclinations are in the directions characteristic of labradorite.

An analysis of this feldspar by Mr. F. W. Taylor, of the National Museum, yielded him the following result:

SiO <sub>2</sub>	53.56 ÷ 60.	.890	3.
Al <sub>2</sub> O <sub>3</sub>	27.78 ÷ 103.	.269	}
Fe <sub>2</sub> O <sub>3</sub>	1.15 ÷ 160.	.007	
CaO	12.01 ÷ 56.	.214	
MgO	tr.		
K <sub>2</sub> O	4.10 ÷ 62.	.066	
Na <sub>2</sub> O	1.68 ÷ 94.2	.018	1.
<hr/>			
	100.28		
SiO <sub>2</sub> :	R <sub>2</sub> O <sub>3</sub> :	RO.	R <sub>2</sub> O: RO
3	1	1	1 2.5

The angles and analysis therefore show that this is a typical labradorite, and as it forms at the St. Paul Island a component of a coarse-grained rock, it may be considered as a type of a triclinic feldspar, which could not be determined in a thin section by means of any method based upon the existence of twinning planes.

I would also call attention to some other cases.

The diorite from Dixville Notch in the White Mountains, described on page 96 of my report on the Lithology of New Hampshire,\* contains

\* Geology of New Hampshire, by Prof. C. H. Hitchcock, vol. III.

large, clear, glassy crystals (microtine of Tschermak) of a feldspar simple in structure, my analysis of which proved it to be andesite. Some of the anorthosites described by Dr. T. Sterry Hunt in the *Geology of Canada*, 1863, were proven by his analysis to be composed of pure labradorite, and some sections of the same which he submitted to me for examination were found to be composed of a multitude of small grains, none of which were twinned. Some of the fine crystals of oligoclase from Bodenmais are simple crystals so far as the ordinary mode of twinning is concerned.

If feldspar habitually showed their cleavages in their sections? the optical method might still be followed with some certainty, but as they do not, when the grains are too small to allow cleavage fragments to be obtained for optical examination, the method followed by me\* in the examination of the feldspathic constituent of the Triassic diabase is the most reliable.

In consideration both of the complexity of the feldspathic element in most rocks, and of the possibility of the simplicity of structure in triclinic feldspars, the very carefully developed methods founded upon the relation of twinning planes and elasticity planes in chance sections are liable to lead to wrong results.

NATIONAL MUSEUM, *April 20, 1881.*

## ON CERTAIN CRETACEOUS FOSSILS FROM ARKANSAS AND COLORADO.

By C. A. WHITE.

In volume III of the *Proceedings of the United States National Museum*, pp. 157-162, five species of Cretaceous fossils (together with some Tertiary species) were described, but not then illustrated. Illustrations of those Cretaceous species are now given on the accompanying plate of this volume, together with those of two other Cretaceous forms which are for the first time described in this article.

The Arkansan species were collected by Mr. E. O. Ulrich in the vicinity of Little Rock, and by him presented to the Museum, together with a parcel of other fossils, mainly mollusca, which he found associated with them. The greater part of these Arkansan specimens are in the condition of mere casts of the interior of the shells, and therefore the determination of their specific and generic relations is not entirely satisfactory in all cases.

\*This volume, page —. The method of separating constituents of rocks by means of a heavy solution was first proposed, according to von Lasaulx, by Fleuvian de Bellevue and Cordier, at the beginning of this century. Church suggested the use of the solution of the iodide of potassium in iodide of mercury, in the *Mineralogical Magazine* in November, 1877.

Thoulet bettered the method and introduced improved apparatus. (*Bulletin de la Soc. Minéral. de France*, 1879, No. 1.) Victor Goldschmidt succeeded in increasing the special gravity of the fluid to 3.2. (*Inaugural Dissertation*, Stuttgart, 1880.)



The following is a list of them so far as their specific and generic identity could be determined:

*Callianassa ulrichi* White.

*Tubulostium dickhauti* White.

*Nautilus texanus* Shumard.

*Turritella*? ——— apparently two species.

*Anchura* ———?

*Lunatia* ———?

*Corbula*? ———?

*Cytherca* ———?

*Crassatella*? ———?

*Axinca* ———?

*Cucullaea* ———?

*Idonearca* ———?

*Modiola* ———?

*Ostrca* ———?

*Gryphca pitcheri* Morton?

Spines of an Echinoid.

The two species described in this article as new were collected by Mr. Cleburn in the valley of South Platte River, a few miles from Julesburg, Colo. He found associated with these two species several other molluscan forms, all of which are characteristic of the later Cretaceous strata, equivalent with those of the Upper Missouri River region, which are generally known as the Fox Hills and Fort Pierre Groups. The following is a list of the species collected by Mr. Cleburn, so far as they are determinable:

*Nautilus dekayi* Morton.

*Placenticeras placenta* Dekay.

*Scaphites conradi* Morton.

*Turris (Sercula) contortus* Meek & Hayden.

*Cantharus?* *julesburgensis* (sp. nov.).

*Pyropsis bairdi* Meek & Hayden.

*Fusciolaria (Piestocheilus) culbertsoni* Meek & Hayden.

*Pyrifusus subturritus* Meek & Hayden.

*Anchura americana* Meek & Hayden.

*Lucina cleburni* (sp. nov.).

*Solemya bilix* White.

*Inoceramus barabini* Morton.

Following are descriptions of the two new species before referred to, and also references to the other five Cretaceous species which were described in volume III, all of which are illustrated on the accompanying plate in this volume.

#### CALLIANASSA ULRICHI White.

(Plate I, Figs. 10 and 11.)

*Callianassa ulrichi*, White 1880, Proc. U. S. National Museum, vol. iii, p. 161.



## TUBULOSTIUM DICKHAUTI White.

(Plate I, Figs. 12 and 13.)

*Spirorbis? dickhauti* White, 1880, Proc. U. S. National Museum, vol. iii, p. 161.

Since the description of this species was published (loc. cit.), certain fragments have been brought to light which indicate that this shell really belongs to a group for which Dr. Stoliczka in Pal. Indica, vol. ii, p. 237, proposed the generic name *Tubulostium*. Our species is indeed very closely related to his *T. discoideum* (op. cit., pl. xviii, figs. 20-25). The tubular prolongation of the mouth is one of the distinguishing features of this group of shells. Our specimens do not show this feature clearly, but it is probable that that portion of the shell has been broken off, as is suggested by the added outline in figure 12.

## CANTHARUS? JULESBURGENSIS (sp. nov.).

(Plate I, Figs. 1 and 2.)

Shell short fusiform; spire moderately elevated; volutions convex, apparently five or six in number, obscurely flattened upon the outer side and obliquely flattened or slightly concave upon the distal side; the outer side of the volutions marked by four strongly-raised revolving ribs (including the two prominent ones which border the flattened portion of the outer side) which are narrower than the spaces between them; the distal side marked by two or three similar, but less distinct revolving ribs, the convex proximal side of the last volution marked by numerous ribs similar to those of the outer side, but which decrease in prominence anteriorly after the first two; longitudinal varices irregular, somewhat numerous, giving the shell, in connection with the revolving ribs, a rugose aspect.

Length about 50 millimeters; diameter of the last volution 22 millimeters. (Museum No. 11468.)

Only a single example of this species has been discovered, and that is imperfect, as shown in the figure. Its characteristics are, however, so well marked that it may be readily recognized as distinct from any hitherto-described form.

*Position and locality.*—Later Cretaceous strata (equivalent with the Fox Hills and Fort Pierre Groups of the Upper Missouri River region) in the vicinity of Julesburg, Colo., where it was obtained by Mr. W. Cleburn.

## LUCINA PROFUNDA White.

(Plate I, Figs. 5 and 6.)

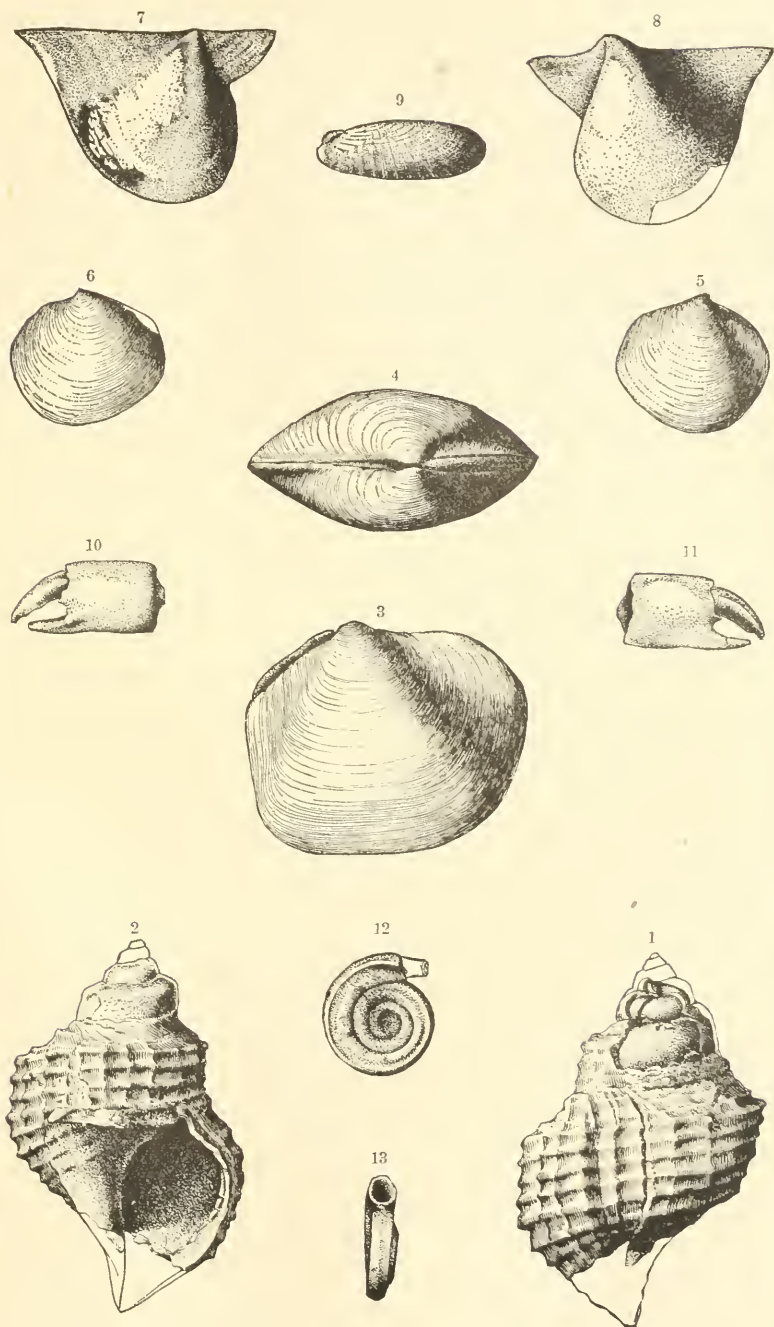
*Lucina profunda* White, 1880, Proc. U. S. National Museum, vol. iii, p. 158.



## EXPLANATION OF PLATE I.

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- FIG. 1. *Cantharus?* *julesburgensis*; lateral view.  
" 2. " " apertural view.  
" 3. *Lucina cleburni*; right-side view.  
" 4. " " dorsal view.  
" 5. *Lucina profunda*; right valve.  
" 6. " " left valve.  
" 7. *Pteria (Oxytoma) erecta*; right valve.  
" 8. " " left valve.  
" 9. *Solemya bilix*; right valve.  
" 10. *Callianassa ulrichi*; left manus; exterior view.  
" 11. " " interior view.  
" 12. *Tubulostium dickhauti*; lateral view.  
" 13. " " peripheral view.  
All of natural size.







## LUCINA CLEBURNI (sp. nov.).

(Plate I, Figs. 3 and 4.)

Shell moderately large, indistinctly pentahedral in marginal outline; valves moderately convex; posterior side truncate, basal border rather short, nearly straight or slightly convex, abruptly rounded up to the posterior border and broadly rounded up to the antero-basal border; front prominent, somewhat abruptly rounded above; antero-dorsal border slightly concave, nearly horizontal; postero-dorsal border slightly convex, sloping downward and backward, its whole length occupied by a large prominent external ligament; lunule very narrow, hardly so wide as the ligament, and extending the whole length of the antero-dorsal border; beaks small, situated subcentrally; umbonal ridge not well defined, passing near the posterior and postero-dorsal borders. Surface marked by the usual distinct lines of growth, and also by somewhat numerous strongly and sharply raised concentric lines, especially upon its upper and umbonal portions.

Length 37 millimeters; height 30 millimeters; thickness, both valves together, 14 millimeters. (Museum No. 11469)

This fine shell bears some resemblance to the preceding, but it is a more robust form, its transverse diameter is proportionally greater, the front more prominent, the basal border less abruptly rounded, and the external ligament larger and more prominent. In its large size it resembles *L. occidentalis* Morton, as identified by Meek and figured in vol. ix, U. S. Geol. Sur. Terr., but in its abrupt posterior truncation and greater prominence of the upper portion of the front it differs conspicuously from that species.

The ligament of this shell is unusually large and prominent for that of a *Lucina*, but it has the outward characteristics of a species of that genus. Besides this, an imperfect separate valve, too fragile for preservation, which was found associated with the other specimens, and which apparently belongs to the same species, shows the hinge, pallial line, and muscular markings which characterize *Lucina*.

*Position and locality.*—Later Cretaceous strata (equivalent with the Fox Hills and Fort Pierre Groups of the Upper Missouri River region) in the vicinity of Julesburg, Colo., where it was obtained by Mr. W. W. Cleburn, and in whose honor the specific name is given.

## SOLEMYA BILIX White.

(Plate I, Fig. 9.)

*Solemya bilix* White, 1880, Proc. U. S. National Museum, vol. iii, p. 158.

This species was also found by Mr. Celeburn, near Julesburg, Colorado.

## PTERIA (OXYTOMA) ERECTA White.

(Plate I, Figs. 7 and 8.)

*Pteria (Oxytoma) erecta* White, 1880, Proc. U. S. National Museum, vol. iii, p. 157.

DESCRIPTION OF A NEW SPECIES OF GOBIESOX (GOBIESOX RHES-  
SODON) FROM SAN DIEGO, CALIFORNIA.

By ROSA SMITH.

Allied to *Gobiesox reticulatus* Girard.

Form essentially like that of *G. reticulatus*, and, as in that species, the snout bluntly and evenly curved. The greatest height of the body is across the pectoral fins, and the width is also greatest between those fins. Head broader than body but less deep. Cleft of the mouth extending to the anterior rim of the orbit. Lips thickish as in *G. reticulatus*. The anterior incisors of the lower jaw are less declined than those of *G. reticulatus*, nearer vertical than horizontal, each of them tricuspid at tip, the central cusp largest; about eight incisors on the mandible. Teeth of the upper jaw conical, in an irregular series of seven to nine, the alternate four or five being larger than the other three. Gill-membranes free from the isthmus. Opercular spine sharp.

Sucking disk entirely similar in form and structure to the other species, its tips extending nearly as far as do the free tips of the pectorals.

The distance from vent to base of the caudal fin is contained in the distance from vent to tip of snout slightly more than one and a half times ( $2\frac{1}{4}$  in *G. reticulatus*).

Length of head contained two and three-fourth times in total length to base of caudal as in *G. reticulatus*; the tail proportionally longer than in *G. reticulatus*, although the vertical fins have fewer rays; in both the dorsal fin is a little longer than the anal, having its origin in advance of the anal and terminating opposite it. The caudal fin is rounded and of a yellowish-white color, generally with few punctulations and these at its base. Dorsal rays 11; anal 10.

Slate color rarely nearly plain, usually with rather broad, distinct, slightly mottled with paler yellowish bands across the dorsal region; the first a distinct band through the eyes, the second much broader and situated at the posterior margin of pectorals; a roundish spot of same color may be seen on each side at the base of the dorsal fin; these spots, when viewed from above, form a third light band, its distance from the second band equalling that between the orbital band and the second or central one. A dark bar at base of caudal. Underneath yellowish, with dark punctulations on the lower jaw and the belly, fine punctulations on the light bands, on dorsal and pectoral fins and base of caudal.

This species is known to me by about fifty examples collected by Mr. Mr. Charles R. Orcutt, and found adhering to stones in company with *Typhlogobius californiensis*\* at Point Loma. It differs from *G. rectieula-*

\* *Typhlogobius californiensis* Steindachner, Ichthyol. Beiträge VIII, Sitzgber. Wien. Akad. 1879, 142 = *Oithonops eos* m. Proc. U. S. Nat. Mus. 1881, 19.

*tus* in the fewer rays in dorsal and anal and in the tricuspid teeth. The usual color is also different.

The type specimens have been presented to the National Museum, and they are numbered 28,396 on the Museum Register. The largest measured  $1\frac{3}{4}$  inches.

*Table of Measurements.*

Locality.....San Diego, Cal.

Dimensions.	<i>G. rhessodon.</i>		<i>G. reticulatus.</i>	
	Inches and 100ths.	100ths of length.	Inches and 100ths.	100ths of length.
Extreme length.....	1. 40	.....	2. 50	.....
Length to base of caudal fin .....	1. 20	.....	2. 05	.....
Body:				
Greatest height.....		20		19
Greatest width .....		27		25
Least height of tail .....		8		9
Length of caudal peduncle.....		9		4
Head:				
Greatest length.....		37		38
Greatest width .....		33		32
Width of interorbital area .....		13		15
Length of snout .....		11		12
Diameter of orbit .....		3		6
Dorsal:				
Distance from snout .....		65		65
Length of base .....		33		35
Anal:				
Distance from snout .....		68		70
Length of base .....		26		28
Caudal:				
Length of middle rays .....		18		22. 5
Pectoral:				
Distance from snout .....		38		39
Length .....		14		13
Anterior margin of ventral disk:				
Distance from snout .....		20		18
Length .....		29		34. 5
Dorsal.....	11	.....	13	.....
Anal.....	10	.....	13	.....

SAN DIEGO, CAL., January 15, 1881.

## DESCRIPTION OF A NEW GENUS AND SPECIES OF COTTIDÆ.

By W. N. LOCKINGTON.

*Chitonotus* gen. nov.

Allied to *Artedius* Girard.

Anal papilla of males excessively developed, and terminating in a narrower crescentic portion, from which springs a long tubular filament. First dorsal incompletely divided into two portions, the anterior the shorter. Lateral line armed with a series of keeled scales, toothed on keel and on hinder margin. Entire upper portion of body, save a narrow area along the base of the dorsal fin, covered with small strongly ctenoid scales. Other characters as in *Artedius*. Type *Chitonotus megacephalus* Lockington.

This genus is instituted for the reception of *Artedius pugettensis* Steindachner (Ichthyol. Beiträge V. 133) and of the species here described.

*Chitonotus megacephalus*.

D. III, VII | 15-16. A. 15-16. C. 9 | 11 | 9. P. 18. V. I | 3.

Body deepest under origin of first dorsal, thence decreasing regularly to the caudal peduncle, which at its narrowest part is about two-sevenths of the greatest depth. Hinder part of head almost quadrangular in section, compressed, the compression increasing from the eyes forward.

Head  $3\frac{3}{13}$ – $3\frac{1}{6}$ ; greatest depth  $6\frac{1}{5}$  times in total length. Greatest width at gill-covers slightly less than greatest depth.

Eyes large, oval, about  $3\frac{1}{4}$  times in length of side of head, their longitudinal diameter exceeding the length of the snout by about five-twelfths; the hinder margin of the orbit rather nearer the tip of the operculum than that of the snout, and the interorbital space very narrow, so that the eyes are directed obliquely upwards.

Upper jaw slightly longer than the lower, which is received within it; posterior extremity of maxillary slightly in front of or beneath the posterior orbital margin. Teeth in both jaws villiform, sharp, uniform, in a long but not wide band. Intermaxillaries protractile downwards. Snout convex longitudinally and transversely.

Nostrils with membranous tubes; the anterior lateral, in a line between the centre of the eye and the tip of the upper jaw; the posterior in a concavity between the extremities of the ascending processes of the premaxillaries and the raised anterior upper orbital margin. Nasal tentacles long but narrow, situated above the anterior nostril and just in front of the sharp, backward-directed nasal spine. Eye tentacles similar to nasal tentacle.

Four preopercular spines; the upper longest, with 2-4 prongs on its upper side besides the tip; second horizontal; third directed downwards; lowest directed downwards and forwards.

Operculum unarmed, its membranous tip vertical with the first ray of the second half of the first dorsal. An inner and outer pair of spines behind each eye on top of head, outer spines the larger. Posterior to these spines a short ridge, ending in a backward-directed spine on back of head. Area between these spines somewhat concave transversely. Suborbital ring and stay narrow.

Origin of first dorsal over the commencement of the free horizontal upper border of the operculum. *First ray nearly equal in height to the length of the head*, second about two-thirds as long, third shorter than fourth, and separated from it by an interspace twice as long as the others, the membrane between these rays also deeply notched. Fifth and sixth rays longer than the fourth or than the following rays, which gradually diminish, giving the upper margin of the second part of the spinous dorsal a rounded outline. Central rays of second dorsal about half as long as the head. Anal similar to second dorsal.

Pectoral fanlike, its base very oblique, parallel with the hinder margin of the operculum, its longest rays about equal to four-fifths of the



head and reaching backwards to the second anal ray. Lower rays very short.

Middle ray of ventral rather longer than the first, considerably longer than the third, and reaching to the base of the anal papilla. All the rays of the preceding fins simple.

Caudal nearly straight on its posterior border, the two outer principal rays simple, the remaining nine once bifurcate. Accessory rays numerous.

Upper part of head and body covered with strongly etenoid scales, except a narrow line along each side of dorsal. The scales of lateral line (about 39) more than twice as long and deep as those above them, etenoid on hinder margin, and with a toothed keel near their upper margin. Lower portion of body scaleless.

Gill-openings continuous; the membrane emarginate, not attached to the isthmus. Branchiostegals six.

Males with a long anal papilla, ending in a crescentic stiff, tapering portion, from the upper side of which, near its tip, springs a long tubular filament.

Color of upper part of body reddish brown or gray, with obscure darker transverse bands. Fins dark olivaceous in recent examples, darkest toward the margins, the pectorals near base and the sides of the head greenish, thickly dotted with black. In some the dorsal and anal are lighter.

I have only seen adult males.

This species was first found in the markets of San Francisco in the summer of 1879, and was noticed by me in a paper published in the Mining and Scientific Press of that city, 1879, in the following terms: "Some months ago I wrote for publication a description of a small sculpin which I named *Chitonotus megacephalus*, the large-headed mailed-back. \* \* \* I find that Dr. Steindachner has got ahead of me, and has described the same fish from specimens obtained in Puget Sound. He also gives a figure. From this figure I judge that the form and proportions of the dorsal fin vary considerably. In my specimens the first spine is exceedingly long, the third quite short, shorter than the fourth, and as these spines are twice as distant from each other as are any of the others, and the membrane between them dips down almost to its base, the fin is practically divided in two. Dr. Steindachner's figure shows only a slight emargination of the fin, the first spine only slightly longer than the others, and the spines equidistant."

Professor Jordan, who has handled numerous examples from Puget Sound, informs me that they agree in every respect with the figure given by Steindachner, and that he has no doubt of the distinctness of the Californian type. In his description Dr. Steindachner mentions the division of the dorsal in terms that lead me to suspect that he possessed both types.



The name *megacephalus*, since it has been published along with a diagnosis of its leading points of difference from *C. pugettensis*, must, I presume, be retained, instead of a more expressive term which might be drawn from the form of the dorsal fins.

*C. megacephalus* is tolerably abundant in moderately deep water outside the Bay of San Francisco. Specimens numbered 27185 are in the National Museum.

#### DESCRIPTIONS OF NEW FISHES FROM ALASKA AND SIBERIA.

BY TARLETON H. BEAN.

Most of the species here described were obtained for the United States National Museum during the summer of 1880, through the assistance of the United States Coast Survey schooner Yukon, whose party the writer was permitted to accompany for the purpose of making collections, more particularly of fishes and fishery statistics, in Alaska. It would have been difficult, if not impossible, to secure so valuable a collection of the fishes in any other way, the Yukon having called at numerous ports along the major portion of the Alaskan coast as well as at Plover Bay, Siberia, where several species not elsewhere found were taken. The whole number of species taken is above 80, and it is due to the Superintendent of the United States Coast Survey and to Mr. W. H. Dall to say that their generous help has made this result possible.

In this article, which is simply preliminary to a detailed account, short notices only are given of fishes which are to be more fully described hereafter.

##### *Lyccdes coccineus* n. s.

Museum Catalogue number 27748; collector's number (1712).

Big Diomede Island, September 10, 1880.

Br. VI; D. including half of caudal 87; A. including half of caudal 69; P. 18; V. 3. Posterior two-thirds of tail covered with scales which are not in contact. Fins and all parts of the body and head scaleless.

The total length of the typical specimen in its fresh state was 19.7 inches (484 millimeters). In its present state of preservation it has shrunk to 475 millimeters.

The species resembles *L. mucosus* Rich., but may be readily distinguished by its more extensive squamation, shorter and deeper head, stouter tail, more advanced position of ventrals and vent, and by its coloration; *L. mucosus*, too, has a lateral line consisting of rounded open pores, while *L. coccineus* has simply a few faint, short linear scratches which are almost imperceptible to the eye. These traces are seen only on that portion of the skin which has scales.

The greatest height of the body is a little less than half the length of the head, which constitutes nearly one-fourth of the total length. The pectoral is twice as long as the intermaxillary and terminates at a dis-

tance from the vent equal to its own length. The distance of the ventrals from the tip of the snout equals one-fifth of the total length. The dorsal begins over the anterior half of the pectoral; the anal, under the twenty-first dorsal ray. The length of the palatine series of teeth equals half that of the maxilla. The tail is much stouter than in *L. mucosus*, resembling that of the species known in this Museum as *L. VahlII*.

**COLORS** (taken from the fresh fish): The colors are somewhat faded. Ground-color brown, with red on the lower parts. Pectorals reddish-brown on the upper half, the lower part carmine; mottlings of whitish at base. Nine bluish-white bands on the dorsal. A few irregular blotches of the same color on the sides. Anal brown mingled with carmine; lips similar. The brown of the body is more or less tinged with carmine everywhere. Under side of head white. The top of the head and the gill-covers have a few small blotches of whitish. A whitish blotch about as long as the eye at the upper angle of the gill-opening.

*Measurements.*

(Taken from the fresh specimen.)

Current number of specimen.....	27748	
Locality.....	Great Diomede, Sept. 10, 1880.	
	Milli- meters.	100ths of length.
Extreme length.....	484	.....
Body:		
Greatest height.....	64	13
Greatest width.....	49	10
Height at ventrals.....	51	10½
Head:		
Greatest length.....	114	23½
Greatest length to upper gill opening.....	110	23
Distance from snout to nape.....	84	17½
Greatest width.....	73	15
Width of interorbital area.....	28	6
Width of interorbital area on bone.....	7	1½
Length of snout.....	34	7
Length of palatine series of teeth.....	29	6
Length of maxillary.....	00	12½
Length of intermaxillary.....	31	6½
Length of mandible.....	63	14
Distance from snout to orbit.....	39	8
Diameter of eye.....	11	2½
Dorsal:		
Distance from snout.....	143	30
Length of base.....	331	70
Length of longest ray.....	29	7
Anal:		
Distance from snout.....	265	52
Length of base.....	230	47½
Longest ray.....	27	5½
Distance of vent from snout.....	240	50
Pectoral:		
Distance from snout.....	124	25½
Length.....	63	13
Ventral:		
Distance from snout.....	96	20
Length.....	11	2½
Branchiostegals.....	VI	.....
Dorsal.....	87	.....
Anal.....	69	.....
Pectoral.....	18	.....
Ventral.....	8	.....

*Stichæus*? *Rothrocki*, n. s.

Seventeen small individuals of the family *Stichæidae* were obtained in Plover Bay and at Cape Lisburne, the largest of them being only 36 millimeters long. The lateral lines are undeveloped, so that I cannot with certainty decide whether my species is a *Stichæus* or a *Eumesogrammus*, but the resemblance to *Stichæus punctatus* appears to me sufficiently great to warrant me in referring it to the same genus.

Catalogue numbers of the types: 27565, Head of Plover Bay, Siberia; 27580, Port Providence, Plover Bay; 27573, Cape Lisburne, Alaska, Arctic Ocean.

Br. VI; D. 48-49; A. I, 34-35; V. I, 4; P. 15; C. 21.

The height of the body equals the length of the head without the snout, and is contained 6 times in the total length without caudal. The length of the head is contained  $4\frac{1}{2}$  times in total without caudal. Snout subconical, equal to eye, which is  $\frac{1}{4}$  as long as the head. Distance between the eyes equals length of snout. The maxilla reaches the vertical through the anterior margin of the pupil. The nostrils are midway between the eye and the end of the snout. The dorsal begins in the vertical through the upper axil of the pectoral, and is connected by a low membrane with the caudal. The anal begins under the 14th dorsal spine, and, like the dorsal, is subcontinuous with the caudal. The pectoral is comparatively short and broad, its length being equal to the height of the body, and to that of the head without the snout. Ventrals short, only  $\frac{1}{3}$  as long as the head and less than half as long as the pectorals; they are placed very close together. The distance of the vent from the snout is contained nearly 3 times in the total length with the caudal. The longest dorsal spines are equal to half the height of the body. The longest anal rays are about  $\frac{2}{3}$  as long as the longest spines of the dorsal. *The expanded caudal is slightly emarginate*, in which the species differs from *S. punctatus* and *Eumesogrammus subbifurcatus*. Teeth in the jaws and apparently on the vomer and palatine bones. Branchiostegal membrane deeply cleft, free from the isthmus.

*Colors*.—Body very light brown, intermingled with numerous light spots in three series (supra-lateral, median, and infra-lateral), those of the median series in some individuals being longer and narrower than those of the other two series. The largest light spots of the supra-lateral series are about  $\frac{2}{3}$  as large as the eye. On the top of the back, traversed by the basis of the dorsal fin, is a series of 10 or 11 whitish spots, the anterior ones being about as large as the eye. A dark stripe around the nose, and continued behind the eye to the end of the operculum. A very narrow dark stripe running along the base of the dorsal, its lower margin seeming to mark the course of the superior lateral line. In some individuals the origin of each anal ray is marked by a minute dark point. Body covered with minute scales.

If, as I suspect, the developed form of the species shows but one lateral line running along the whole length of the dorsal and not far re-

moved from it, this character, combined with the emarginate caudal, will entitle the species to rank as the representative of a distinct genus for which the name *Notogrammus* is here proposed.

The species is dedicated to my preceptor in zoölogy and medicine, Dr. J. T. Rothrock, of West Chester, Pennsylvania.

*Murænoides maxillaris*, n. (?) s.

? *Murænoides fasciatus*, (Bl. Schn.)

Catalogue number of the single type specimen 23999, collected in 1872 by Mr. Henry W. Elliott, at Saint Paul Island, Bering Sea.

Br. vi—v; D. 88; A. ii, 43; V.  $\frac{1}{2}$ , 1.

This species, as well as *M. ornatus* Girard, may be at once separated from *M. nebulosus* Schleg. by its scaleless head.

When the mouth is closed the cleft is very little oblique and the tip of the lower jaw is in a horizontal through the middle of the eye; the width of the mouth across the tips of the maxillæ equals the length of the pectoral and almost one-half the length of the head. The length of the maxilla equals one-half the distance from the end of the snout to the beginning of the dorsal. The mandible is as long as the pectoral.

The greatest height of the body slightly exceeds the length of the head and equals one-seventh of the total length without the caudal; it equals, also, one-fourth of the distance from the end of the snout to the beginning of the anal. The length of the head is contained  $8\frac{1}{2}$  times in the total length. The width of the interorbital space is a little less than the diameter of the eye, which equals the length of the snout. The length of the pectoral equals one-half the height of the body at the origin of the anal; the greatest width of the fully expanded fin is nearly equal to the length. The ventral spine is two-thirds as long as the eye.

The greatest height of the dorsal is not far from the origin of the fin, and equals one half the length of the mandible. The length of the caudal equals one-half the length of the head. The vent is not far behind the middle of the total length, and is directly under the 43d dorsal spine.

Colors from the alcoholic specimen: A brown band occupies the whole interocular space, and is preceded and followed by a whitish band only one-half as wide. Immediately below the eye a brown band, whose width equals one-half the length of the eye, extends down to the throat; a whitish band a little wider than the brown one is immediately behind it. It seems as if the fresh fish may have on this part of the head two whitish bands with a brown one between them. Back with a series of 11 rounded or oblong light spots, the longest of which is one-half as long as the head; all of these spots include at the top a rather large brown spot and below numerous little brown spots. Between the first and second large light blotches are two very dark spots on the dorsal membrane, and between the dark spots there is a light one of similar size. On the sides are about 26 light bands, most of them very distinctly



defined, especially between the gill-opening and the vent. Behind the vent the bands are not so well marked, and a few small light spots are in the intervals between them. The ground color of the fish is brown. The longest light bands are about as long as the head.

I have not seen *M. fasciatus*, and know it only from the descriptions and figures. These seem to indicate a species with the maxilla only one-third as long as the space between the tip of the snout and the beginning of the dorsal, with the ventrals little developed and with the head less than one-tenth of the total length. *M. maxillaris* has a much longer maxilla, a wider mouth (measured over the tips of the maxillæ with the mouth closed), well developed and separate ventrals, and the head nearly one-eighth of the total length.

*Liparis gibbus*, n. s.

This is a species resembling *L. fabricii* Kröyer and *L. tunicata* Rhdt. in its dorsal and anal ray-formulæ; but it shows important differences from both.

From *L. fabricii* it may be at once distinguished by its smaller eye (one-fourth as long as the head) and its depressed snout (the distance from the angle of the mouth to the base of the anterior nostril being less than one-half the greatest depth of the head). It differs from *L. tunicata* in having (1) a larger eye, (2) a much smaller number of pectoral rays, (3) a much smaller number of unarticulated dorsal and anal rays.

In preparing the description, I have made use of the following specimens:

24010 (1203), Unalashka, W. H. Dall (1 specimen).

24047, Saint Paul Island, 1872, H. W. Elliott (1 specimen).

26625 (1654), off Cape Tchaplín, Siberia, 1880, Dall & Bean (1 specimen).

27535 (1722), Plover Bay, Siberia, 1880, Dall & Bean (1 specimen).

27545 (1638) Plover Bay, 1880, Dall & Bean (2 specimens).

Of these number, 24047 is in the best state of preservation, the lax integument being largely or partly separated from the body in most of the other individuals. I have examined number 27535 most closely to learn the structure of the fins, and find that it has 44 dorsal rays, of which only the first 12 are not articulated; the anal has 36 rays, only the first one being unarticulated; the pectoral has 35 rays, and the caudal 12. The radial formulæ of the other examples are as follows:

24010, D. 38+; A. 29+.

24047, D. 42; A. ca. 32.

26625, D. 41; A. ca. 33.

27545a, D. 42; A. 35.

27545b, D. 42; A. ca. 34.

The dorsal and anal are connate with the caudal, the free portion of the caudal being only about one-third as long as the head. The great-



est width of the head is nearly equal to its greatest length and exceeds its greatest depth. The interocular region is shallow concave, and the vertex and nape are somewhat elevated. The snout is obtuse and moderately depressed. The body is rather abruptly compressed at the vent, where its thickness equals only one-third of the length of the head. The anterior dorsal rays are regularly graduated, and much shorter than the rays in the middle of the fin. The longest dorsal ray is one-half as long as the head. The length of the eye is contained 4 times in that of the head, which equals one-fourth of the total length with caudal. The length of the snout equals one-third of that of the head. The nostrils are tubular, the anterior pair having much the longer tubes, their distance from each other equaling the length of the eye. The maxilla extends to below the anterior margin of the pupil. Dentition as in *L. fabricii*. The ventral disk is nearly circular, its length contained 8 to  $8\frac{1}{2}$  times in the total length. The distance of the dorsal from the snout equals nearly one-third of the total length without the caudal. The length of the caudal equals about one-seventh of the total length. The greatest height of the body equals the length of the head. The pectoral extends to the origin of the anal.

Colors of specimen 26625 taken from the living fish.

(Dredged off Indian Point (Cape Tchaplín), E. Siberia, Behring Strait, August 15, 1880.)

Upper parts gray, punctulated with brown; on the top of the snout and on head and back, as far as beginning of dorsal, two concentric stripes or elongated rings of brown inclosing gray areas; similar stripes along side of head, and extending back to near middle of body; also on posterior part of body; between these long stripes are two irregular rings of brown inclosing gray; a brown stripe along lower part of head and body, blending into a wider area of brown of the lower parts; belly yellow on the sides, and punctulated with brown; iris brown, mingled with a little vermilion; pupil has a yellow margin; fins brown and punctulated; a dark band at caudal base; snout whitish on top.

A more common pattern of coloration is the following:

Head and body very light brown or gray intermingled with brown; belly and under surface of head lighter; dorsal and anal with some irregular dark markings simulating bands; caudal with three dark bands; sometimes the posterior half of the body is mottled with dark blotches.

***Cottus humilis*, n. s.**

Museum number 27972; collector's number (1700). Chamisso Island, Eschscholtz Bay, August 31, 1880.

D. X, 16; A. 13, V. I, 3; P. 18; Br. VI.

Head broad, subtriangular, much depressed, contained  $2\frac{2}{3}$  times in total length, caudal included. Greatest depth of head contained  $2\frac{2}{3}$  times in its greatest length. Eye equal to interocular space, contained twice in length of snout and 4 times in postorbital portion of head to

end of opercular flap. Whole upper surface of head covered with small skinny tubercles. Vomerine patch of teeth very large.

Two strong spines above the snout, an obtuse prominence above each orbit and a pair on the occiput. In large individuals there is a tendency towards division and enlargement of the prominences and their extension, so as to form imperfect keels on the vertex. Behind the supra-orbital prominences are several radiating sharp ridges similar to those of *C. polyacanthocephalus*. Interocular space concave. There is also a depression on the vertex, becoming narrower posteriorly. Three pre-opercular spines, the uppermost being longest and equal to the eye in length. The longest dorsal spine (fourth) is half as long as postorbital part of head, or slightly more. The length of the maxillary bone is contained  $2\frac{1}{3}$  times in the length of the head. End of maxilla reaches slightly past hind margin of eye. The ventrals when extended straight backwards are equal to their distance from the beginning of the anal. The pectorals reach the vertical from the beginning of the soft dorsal. Skin above the lateral line with a single series of rough bony tubercles which are finely toothed and sometimes depressed in the centre. A few similar but smaller spiny tubercles below the lateral line.

The dorsals are separated by a short interspace. The spinous dorsal begins in a line with the upper axil of the pectoral. The longest ray of the second dorsal is contained 4 times in the distance from the tip of the snout to the beginning of the second dorsal. Tail little rounded, contained  $5\frac{1}{2}$  times in total length without caudal.

Colors of the alcoholic specimen: Purplish brown above, whitish below. First dorsal has two broad, oblique dark bands separated by a light area. Second dorsal has about 5 dark bands, anal about 6. The pectorals have about 4 interrupted bands; the caudal has 3. Ventrals whitish, faintly tinged in two areas with dark color. Sides with a few white blotches; a larger individual has, also, some small white blotches on the belly.

Length of type 240 millimeters ( $9\frac{1}{2}$  inches).

	Inches.
Length of head .....	3.4
Length of snout .....	.8
Greatest height of body .....	1.5
Least height of tail .....	.4
Greatest width of body .....	1.6
Width of interocular space .....	.5
Long diameter of eye .....	.5
Length of fourth dorsal spine .....	.9
Length of fifth dorsal ray .....	1.2
Length of sixth anal ray .....	.9
Length of pectoral .....	1.9
Length of ventral .....	1.3
Length of caudal .....	1.4
Length of maxilla .....	1.4

*Cottus niger*, n. s.

Museum numbers 23929, 27952, and 27971. Collector's numbers (1621), (1622), (1623), (1624), (1625).

St. Paul Island, Bering Sea, 1872 (H. W. Elliott), and August 6, 1880 (Dall & Bean, from Mr. Armstrong).

Br. VI; D. IX, 15-17; A. 11-13; V. i, 3; P. 16-17.

Two very blunt prominences above the snout entirely enveloped in the skin in a specimen 10 inches long. No spines above the orbits or on the occiput. The spines at the upper angle of the preopercle are the only ones that are not covered up in the skin, and these are almost hidden. The two uppermost preopercular spines are the only sharp ones present. Top of head covered with fine skinny granulations and the vertex with numerous slender tentacles. The place of the supraorbital spine is occupied by a soft tentacle of moderate length. The longest preopercular spine is as long as the eye, which is  $\frac{1}{5}$  as long as the head to the end of the opercular spine, and equal to the width of the space between the eyes. Snout equals length of orbit. Jaws equal, the lower not at all received within the upper. Maxilla, longer than fourth dorsal spine, equals one-half length of head to end of opercular spine, and extends to hind margin of orbit. Head one-third, or slightly less than one-third of total length, caudal included. Longest dorsal spine is contained 7 to 9 times in total with caudal. The longest anal ray is contained about 3 times in length of head. Caudal and ventral equal to one-half length of head. Pectoral as long as post-orbital part of head and does not reach the vent, which is in the middle of the total length with caudal. Caudal rounded. Height of body at origin of dorsal is a little less than its width at the base of the pectorals and is contained from 5 to 6 times in total length, caudal included. The spinous dorsal begins at a distance from the tip of the snout equal to one-third of the total length without caudal. Skin smooth.

Colors of the alcoholic specimens: Very dark brown (almost black) with a purplish tinge in some individuals; sides mottled with lighter brown and whitish and frequently bearing large, roundish white blotches similar to those of the male *C. grönländicus*. These white blotches in some instances become confluent over the greater portion of the belly. Posterior surface of the pectoral with white blotches near the margin in some examples, and uniform dark brown in others. There is no individual that is entirely free from white blotches. In some examples the belly is dark, very little mingled with whitish. Lips and lower surface of head in some examples have numerous nearly black spots, the largest of which are not more than one-third as long as the eye. The largest of the types is 10 inches long.

*Cottus niger* has many points of resemblance to *C. Brandti* Steind., but there are too many important discrepancies to allow me to identify it with Steindachner's species. (1) the length of the head is not more than  $\frac{1}{3}$  of total length with caudal in any of our 14 examples; (2) the vomer-

ine, intermaxillary, and mandibular teeth are all of equal size and strength; (3) the distance between the eyes measured on the bone is always equal to the length of the eye ( $\frac{2}{3}$  of length of eye in *Brandti*); (4) there are no prominent occipital ridges such as are figured in *C. Brandti*, but the vertex has numerous slender filaments; (5) the length of the ventral is  $\frac{1}{2}$  that of the head ( $\frac{2}{5}$  in *C. Brandti*); (6) the length of the caudal is nearly twice as great as the distance of the front margin of the eye from the tip of the jaws; (7) the bony plates of the lateral line are so thin and soft that they are inconspicuous under the skin; (8) the ventrals of *C. niger* are always either purplish dark-brown with whitish tips, or whitish with several dark bands. There are white blotches on all our examples notwithstanding the great variation in size.

**Cottus verrucosus, n. s.**

27547 (1638). Plover Bay, Siberia, August 13, 1880, T. H. Bean.

Br. VI; D. XI, 16; A. 15; V. I, 3; P. 17; C. 12 (developed rays).

Length of the typical specimen  $3\frac{1}{2}$  inches (88 millimeters).

Two sharp spines above the snout. A short tentacle above the posterior part of each orbit and one on each side of the vertex. Vertex and interorbital space deeply concave. Crown, nape, and interorbital region with small skinny warts. Three preopercular spines, the uppermost being as long as the short diameter of the eye. Eye equals snout which is  $\frac{1}{4}$  as long as the head to the end of the opercular spine. Lower jaw barely included within the upper. The maxilla is longer than the fourth dorsal spine, which is only a little longer than the eye and less than  $\frac{1}{3}$  as long as the head. The maxilla equals  $\frac{1}{6}$  of the total length without the caudal, and nearly  $\frac{1}{2}$  the length of the head; it extends to below the middle of the eye. The mandible extends to the hind margin of the eye; its length equals  $\frac{1}{2}$  the distance from the tip of the snout to the beginning of the dorsal. The head is  $\frac{1}{3}$  of the total length with caudal. Teeth in the jaws and on the vomer. The longest dorsal spine equals the longest anal ray and  $\frac{1}{10}$  of the total length with caudal. The length of the ventral equals  $\frac{1}{6}$  of the total length without the caudal. The vent is slightly in advance of the middle of the length with caudal. The pectoral reaches to the origin of the anal. The caudal is  $\frac{1}{2}$  as long as the head. The height of the body at the beginning of the dorsal is contained  $4\frac{1}{2}$  times in the total length without the caudal, and is a little greater than its greatest width. The distance of the first dorsal from the tip of the snout equals about  $\frac{1}{3}$  of the total length without the caudal. Skin smooth. Lateral line with numerous short accessory branches extending upward and downward and placed exactly opposite each other.

Colors of the alcoholic specimen: Upper parts very dark brown; belly and under surface of head whitish; whitish on the sides along and behind the anal fin; spinous dorsal colored like the body but with a median and a posterior light band; soft dorsal with about five dark-brown bands



alternating with whitish; caudal whitish on its anterior third, the rest of the fin having brown on the skin covering the fin-rays; the pectoral has five brown bands; the anal is all whitish except a dark stripe running through near its middle; the ventrals are whitish.

\* *Gymnacanthus galeatus*, n. s.

Museum catalogue number 28097; collector's number (1603). Five individuals were caught on a trawl-line at Iliuliuk, Unalashka, July 30, 1880, for Messrs. Dall & Bean, by Sylvanus Bailey.

As these specimens differ in several important details from our examples of *G. pistilliger* from the Atlantic and from Siberia as well, I will briefly indicate the differences and call attention to them by giving the species a new name.

The smallest example is  $7\frac{3}{8}$  inches long; the largest,  $10\frac{1}{2}$  inches.

Br. VI; D. XI, 16-17; A. 19; V. I, 3; P. 19-20.

No vomerine teeth. Two small spines above the snout; a small tubercle at the upper posterior margin of each orbit. Four preopercular spines, the upper as long as the short diameter of the eye, bearing two or three antler-like processes. The space between the eyes is deeply concave and *completely covered* by aggregated bony granulations, as are also the crown and the neck. Similar bony granulations are at the hind margin of the orbit, on the suborbital ridge, and on the opercles. The body is naked. The pectorals and, in males, the ventrals reach beyond the origin of the anal; in females the ventrals do not reach the vent. Dorsals and pectorals with interrupted black bands as in *G. pistilliger*; ventrals and anal uniform whitish; back with four distinct brown spots, the longest nearly twice as long as the eye, extending a little below the lateral line, and there blending into an interrupted wavy brown lateral stripe. The maxilla extends to below the middle of the eye. *The greatest height of the body is contained twice in the length of the head*, and  $7\frac{1}{2}$  times in the total length including the caudal. Pectoral as long as the head without the snout, its upper axil immediately under the beginning of the spinous dorsal.

*Gymnacanthus galeatus* may be at once distinguished from *G. pistilliger* by its longer and more bony head and its elongate form. I have compared it with specimens of *G. pistilliger* from Norway, Cumberland Gulf, and Eastern Siberia.

*Hemilepidotus Jordani*, n. s.

Museum number 27598; collector's number (1602).

Length of larger type, 13 inches; smaller,  $10\frac{1}{8}$  inches.

Taken at Iliuliuk, Unalashka Island, on a trawl-line, by Sylvanus Bailey, July 30, 1880.

Larger, D. X, i, 21; A. 17; V. i, 4.

Smaller, D. X, i, 21; A. 16; V. i, 4.

The dorsal band of scales contains 4 rows at the widest part (6 rows in *spinosus*).



Height of body  $1\frac{2}{3}$  times in length of head, and  $4\frac{1}{2}$  times in total length without caudal. Length of head  $2\frac{2}{3}$  times in length of fish without caudal.

Eye equals snout and one-fourth of head. Interorbital space equals short diameter of eye (only half of short diameter in *spinus*).

Distance of spinous dorsal from tip of snout equals length of pectoral (the pectoral is much shorter in *spinus*).

First spine of dorsal equals maxilla in length (only half as long as maxilla in *spinus*). Longest dorsal spine (5th) is contained  $2\frac{1}{2}$  times in length of head (4 times in *spinus*).

Pectoral reaches to origin of anal; ventral, nearly or quite to vent.

Maxilla extends slightly behind middle of eye; mandible, to posterior margin of eye.

Throat and belly pure white. No spots as in *trachurus*.

*Hexagrammus scaber*, n. (?) s.

? *Hexagrammus superciliosus* (Pall.)

In the collection of Alaskan fishes are two small individuals of the genus *Hexagrammus*, which I cannot refer definitely to any known species. They are nearest to *H. superciliosus* Pallas, but, as we have none of the young of this species, I must compare them with half-grown examples. From these and from the adult my species differs (1) in having a rudimentary but quite distinct median lateral line, (2) in the absence of palatine teeth, (3) in having a forked caudal, whereas *superciliosus* has a distinctly rounded caudal. It may be found that a large series of specimens of different ages will show a gradation into *superciliosus* by the acquisition of palatine teeth, the obsolescence of the median lateral line, and a change in the form of the caudal; but there is nothing to base such a conclusion upon at present, and I desire to call attention to the form by describing it as probably new.

The types are numbered 23961, Amchitka, W. H. Dall, and 27920, Unalaska, T. H. Bean. The first measures  $2\frac{9}{10}$  inches and the second  $2\frac{7}{10}$  inches to the base of the middle caudal rays.

23961—D. XX, 25; A. 23; V. i, 5; L. lat. about 100; 6 lateral lines.

27920—D. XXI, 25; A. 24; V. i, 5; L. lat. about 107; L. transv. about 50; 6 lateral lines.

In this description number 27920 is taken for the principal type, since, being a more recent specimen, it shows the characters more clearly.

Body oblong, moderately compressed, its depth near the origin of the dorsal equals the length of the head (excluding the opercular flap) and is contained  $4\frac{1}{2}$  times in the total length to the base of the middle caudal rays; upper outline of head convex, but with a slight frontal depression. The least height of the tail equals one-half the length of the head, or one-ninth of the total length to base of caudal.

The distance between the eyes is contained three times in the length of the head. The snout is blunt and only two-thirds as long as the eye, which is one-third as long as the head and equals the interorbital dis-

tance. Jaws equal. The maxilla does not quite reach to below the anterior margin of the pupil, and is one-third as long as the head. The mandible extends to below the middle of the eye and is contained 10 times in the total length to base of middle caudal rays. A tentacle above each orbit. Teeth in the jaws and in the vomer; none on the palatine bones.

The spinous dorsal originates immediately over the base of the pectoral; its longest spine is one-eleventh as long as the fish without the caudal. The longest ray of the second dorsal equals the length of the post-orbital part of the head. The dorsals are separated by a deep notch, immediately under which the anal originates.

The length of the anal base equals one-third of total length without the caudal. The vent is equidistant from the tip of the snout and the base of the middle caudal rays.

The middle caudal rays are only  $\frac{2}{3}$  as long as the longest rays, the caudal being decidedly forked.

The distance of the pectoral from tip of snout equals one-fourth of the total length to base of middle caudal rays; the pectoral does not quite reach to the vent; its length equals that of the head including the opercular flap.

The distance of the ventral from the snout is slightly more than twice the length of the ventral, which is one-seventh of the total length to base of middle caudal rays.

There are 6 lateral lines on each side, the uppermost of which meets its fellow of the opposite side in front of the dorsal, is continued forward on the nape by a single short line, runs backwards close to the dorsal, base and ends at about the beginning of the last third of the soft dorsal. The second begins on the nape, is one-half as far from the uppermost as it is from the third, and extends to the caudal. The third begins at the extreme upper limit of the gill-opening, curves very gradually to follow the dorsal outline until it reaches the end of the second dorsal, whence it runs straight out on the caudal. The fourth begins a little above the pectoral, curves very slightly downward and disappears about the middle of the body; it is not so well developed as the rest. The fifth originates close under the pectoral, near the gill-opening, passes above the ventral and on the lower part of the side of the body, ending at about the beginning of the last third of the anal. The sixth meets its fellow of the opposite side a little behind the ventral base (a single line extending forward from this junction on the median line of the belly as far as the throat) and runs backward close to the base of the anal fin, ending on the caudal. The scales are everywhere very rough.

Colors: Each of the dorsals has 3 black blotches, smaller than the eye, resembling bands but not extending to the bases of the fins. The pectorals, ventrals, and anal are uniform yellowish white. The body is light brown above and silvery or golden on the sides and lower parts.

*Coregonus laurettæ*, n. s.

Among the fishes brought down from northern Alaska during the summer of 1880 are 4 white-fish taken at Point Barrow by the U. S. S. Thomas Corwin, Capt. C. L. Hooper commanding, and one of the same species obtained at Port Clarence, by the U. S. Sch. Yukon. The museum catalogue numbers of these specimens are:

27695. Point Barrow, 1880, (4 examples).

27915. Port Clarence, 1880, (1 example).

The species is allied to *C. Artedi* Le Sueur and to (*C.*) *lucidus* Richardson. It differs from *C. Artedi* in the following particulars:

- (1) The eye is  $\frac{1}{5}$  as long as the head ( $\frac{1}{4}$  in *Artedi*);
- (2) The length of the dorsal base corresponds with that of 16 oblique series of scales immediately under it (10 in *Artedi*);
- (3) The length of the mandible is contained  $2\frac{1}{3}$  times in that of the head ( $2\frac{1}{8}$  times in *Artedi*);
- (4) The lateral line runs through 84 to 95 scales (not more than 77 in *Artedi*); there are 10 scales in a transverse series from the origin of the dorsal to the lateral line and as many from the origin of the ventral to the lateral line (9-9 in *Artedi*);
- (5) The ventral has 12 rays (11 in *Artedi*).

From *C. lucidus* it is separated by the following characters:

- (1) There are lingual teeth (none in *lucidus*);
- (2) The ventral appendages are less than one-half as long as the ventral (more than one-half in *lucidus*);
- (3) The transverse rows of scales between the origins of dorsal and ventral and the lateral line are 10-10 (10-8 in *lucidus*);
- (4) The lower jaw is contained  $2\frac{1}{3}$  times in length of head ( $2\frac{1}{8}$  times in *lucidus* according to Richardson's measurements);
- (5) Judging from the figure given by Richardson the number of rows of scales under the dorsal base of my species is 6 greater than in *lucidus*.

## DESCRIPTION.

Br. IX-X; D. 11-12 divided rays; A. 10-11 divided rays; V. 12; P. 16; L. lat. 84-95; length of types 12-16 inches.

The height of the body is greater than the length of the head and equals one-fourth of the total length without the caudal; the distance of the nape from the front margin of the jaw is contained  $2\frac{1}{2}$  times in its distance from the beginning of the dorsal. The diameter of the eye equals the length of the snout and about  $\frac{1}{5}$  that of the head. Maxillary reaches nearly to the middle of the eye, its length contained  $3\frac{1}{2}$  times in that of the head; the supplemental bone is slightly more than half as long as the maxilla and its greatest width equals  $\frac{1}{3}$  of its length. The length of the mandible equals  $\frac{2}{7}$  of that of the head, reaching to the hind margin of the orbit. The appendage of the ventral fin is less than half as long as the fin and nearly equal in length to the 7 scales immediately over it.

This white fish is also represented in the National Museum by two well-preserved specimens (Nos. 24023 and 24024) collected by William H. Dall, March 12 and March 19, 1867 (collector's numbers 666 and 672), at Nulato on the Yukon River.

I dedicate the species to my wife, Lauretta H. Bean.

**Ptilichthys**, n. g. (*Mastacembelidae*?)

Body elongate, serpentiform, apparently covered with very thin scattered scales. Mandible little movable, projecting, with a skinny appendage at tip. Cleft of the mouth narrow. Minute teeth in a single series in the jaws, becoming larger and slightly curved posteriorly. Margin of upper jaw formed entirely by the intermaxillaries. Maxilla curved forward below. The gill-opening extends up to the middle of the base of the pectoral; the membrane is slightly emarginate behind and is free from the isthmus; 4 gills, a slit behind the fourth. Gill-rakers stout and short, moderate in number. Spinous portion of the dorsal consisting of many isolated spines, a narrow membrane behind each. Soft dorsal and anal with many rays. End of the tail free. Ventrals none.

**Ptilichthys Goodei**, n. s.

Museum number 26619, collector's number (1590)—Dall and Bean.

Dredged in 10 fathoms at the entrance to Port Levasheff, Unalashka, on the ridge, hard bottom, by Sylvanus Bailey, July 28, 1880.

I am indebted to the Alaska Commercial Company of San Francisco for the loan of the only other known specimen, an example 302 millimeters long taken at Unalashka. Length of type 160 millimeters. The species is dedicated to my colleague, Mr. G. Brown Goode.

Br. V; D. XC, 145; A. ca. 185; P. ca. 12.

Greatest height of body equals the post-ocular part of the head. Eye, equal to snout, 5 in head. Head  $15\frac{1}{3}$  times in total length. Maxilla extends to a little beyond the front margin of the orbit; mandible to middle of the eye. The mandibular appendage is one-half as long as the eye. The dorsal begins slightly in advance of the pectoral; the spinous portion equals  $6\frac{1}{2}$  times the length of the head. The distance from the tip of the lower jaw to the anus equals  $4\frac{2}{3}$  times the length of the head. The anal begins under the fifty-third spine of the dorsal. The pectoral is half as long as the head. None of the dorsal spines are quite equal to half the length of the eye. The soft dorsal and the anal are highest near the middle of their length; the height of each equals about  $\frac{3}{4}$  of the body height at the same point. The free caudal tip is about  $\frac{2}{3}$  as long as the eye.

**Raia parmifera**, n. s.

Collector's number (1753); Museum number 27651.

Taken at Iliuliuk, Unalashka, October 12, 1880, and preserved almost entire after measurements and color notes were made.



Disk broader than long; tip of snout slightly projecting. Anterior margin of pectorals convex in front, then shallow concave, posterior margin convex. Interorbital distance, measured on the bone, is contained  $3\frac{1}{2}$  times in distance from tip of snout to a line connecting the front margins of the orbits. Interocular space deeply concave in the preserved specimen.

Breadth of disk equals distance from tip of tail to shoulder-girdle. Length of tail equals distance from its root to middle of eye.

Tail nearly flat below with a well-marked lateral fold which is widest posteriorly, but nowhere equals the height of the caudal. Caudal small, its height (7<sup>mm</sup>) contained 3 times in its length (21<sup>mm</sup>).

Mouth slightly arched, its width equal to 3 times the length of first dorsal base. Nasal flaps with a few fringes posteriorly. Distance between nostrils contained  $1\frac{1}{2}$  times in their distance from tip of snout. Teeth in 26 or 27 rows, with a short, moderately sharp median cusp, which is occasionally much worn in the front of the jaws.

The largest spiny bucklers on the back are 17 millimeters long at the base.

Snout above, supra-occipital region and the whole margin of pectorals and ventrals covered with small prickles, as is also an area along the tail, especially on its anterior half. Along the middle of the back and the top of the tail is a row of 29 large spines. Between the dorsals is a single large spine. Along the sides of the tail are spines a little larger than those around the margin of the disk. The greater portion of the disk is smooth. In a male, number 28098, of which we have portions only, the bucklers are in about 22 rows, with 6 in a row at the widest part; the claspers are slender and more than one-half as long as the tail.

Under surface smooth, with the exception of an elliptical patch of small spines near the tip of the snout.

General color olive-brown above. There are numerous indistinct light blotches on the disk, two of them larger than the rest; the largest is twice as long as the eye, and surrounds an inner blotch of white nearly as long as the eye. There are two small light blotches, one on each side of the tail, between the 17th and 18th spines of the median series.

#### Measurements.

Current number of specimen .....	{	(1753)
Locality .....	{	27651 ♀
	{	Unalashka,
	{	Oct. 12, 1880.
		Millimeters.
Extreme length .....		975
Length of disk .....		507
Body:		
Greatest width of disk .....		685
Greatest width of tail at base* .....		47
Length of branchial area .....		70
Width of branchial area in front .....		196
Width of branchial area behind .....		136



## Measurements—Continued.

	Millimeters.
Head:	
Distance between outer edges of spiracles .....	119
Greatest width of mouth .....	105
Width of interorbital area on the bone .....	48
Length of snout from eye .....	153
Length of eye .....	30
Length of snout from mouth .....	140
Length of spiracles .....	32
Distance from snout to first dorsal .....	875
Distance between outer humeral spines .....	125
Dorsal:	
Length of base of first dorsal .....	32
Height of first dorsal .....	24
Interval between dorsals .....	16
Length of second dorsal .....	30
Height of second dorsal .....	26
Length of base of ventrals .....	134
Distance from snout to end of base of pectoral .....	510
Distance between outer edges of nostrils .....	90
Distance from snout to outer angle of disk .....	463
Caudal:	
Length of base .....	21
Height .....	7
Ventral:	
Length .....	68

\* Taken where the ventral insertion ends.

**Ammocætes aureus**, n. s.

? *Petromyzon Fluvialis* Rich. Franklin's First Journey, 1823, p. 705; F. B. A., p. 294.

? *Petromyzon borealis* Grd. Pacific R. R. Report, Fishes, p. 377 (without description).

Maxillary tooth single, bicuspid; mandibulary with seven cusps, those at the ends being larger than the other five. Head shorter than the space occupied by the branchial openings and contained  $10\frac{1}{3}$  times in the total length ( $5\frac{1}{3}$  times in the distance from the end of the lip to the beginning of the first dorsal). The distance from the eye to the first dorsal is 3 times as long as the first dorsal base. Second dorsal base is twice as long as the first, and the fin is twice as high as the first at its highest part. The interspace between the dorsals is about  $\frac{2}{3}$  as long as the head. The distance from the vent to the end of the tail is one-fourth of the total length. Eye nearly twice as large as the largest branchial opening.

Colors of the alcoholic example: Back plumbeous, sides and belly golden yellow, under surface of head and neck silvery.

Length of type, 15 inches; catalogue number, 21524; collector's number, 1038, Anvik, Yukon River, Alaska, Lucien M. Turner (Lat.  $63^{\circ}$  N., Lon.  $160^{\circ}$  W. from Greenwich). Mr. Turner notes that it is extremely abundant and is used for food.

U. S. NATIONAL MUSEUM, May 5, 1881.

**DESCRIPTION OF A NEW SPECIES OF FISH, APOGON PANDIONIS,  
FROM THE DEEP WATER OFF THE MOUTH OF CHESAPEAKE  
BAY.**

**BY G. BROWN GOODE AND TABLETON H. BEAN.**

Among the fishes collected in October, 1880, by Capt. Z. L. Tanner, on the Fish Commission steamer Fish Hawk, off the entrance to Chesapeake Bay, is a single specimen of a species of *Apogon*, apparently new to science. The specimen being somewhat mutilated, this description is necessarily incomplete.

*Apogon pandionis*, new species. Goode and Bean.

Body oblong, rather robust, its greatest width (behind the gills) being equal to half the length of the head, and contained six times in the length of body without caudal; its greatest height contained about thrice and two-thirds in the body length. Least height of tail almost equal to half the greatest height of the body. Scales, small cycloid, forty-five in the lateral line; three longitudinal rows above and nine below the lateral line; lateral line complete.

Length of head one-third of standard length of body, its greatest width equal to greatest width of body. Length of snout four and one-half times in length of head. Maxilla extends to a point a very little behind the anterior margin of the pupil, the mandible to the vertical from the middle of the eye. Length of maxilla equal to long diameter of the eye. Preoperculum apparently unarmed. Operculum with two flexible points near its upper posterior angle. Gill-rakers very long and slender.

Eye nearly circular, its longest diameter nearly equals half the length of the head and is contained seven times in the standard body length nearly horizontal. Width of interorbital space equals two-thirds the diameter of the eye. Mouth oblique, the lower jaw projecting. Dentition in jaws hardly perceptible. Feeble teeth on the head of the vomer and on the palatine bones.

Distance of dorsal from snout equal to twice the greatest width of the body; its longest spine (fourth) equal in length to three-fourths the diameter of the eye. Distance from origin of first dorsal to origin of second dorsal equal to twice the length of the base of the latter

Distance of anal from snout equal to twice the length of the head; the length of its base is equal to two-thirds the length of the eye; of its longest ray to the length of the maxilla. First anal spine minute, its length equal to one-fourth of the least height of the tail; the second anal spine at least twice as long as the first. Caudal deeply furcate, scaled upon the lower portions of the lobes.

Distance of pectoral from snout equal to length of head; its length equal to that of the maxilla.

Distance of ventral from snout slightly greater than one-third of the standard body length.

*Radial formula*.—D. VII, I, 9; A. II, 7 $\frac{1}{2}$ ; P. 16; V, I, 5.

*Scales*, in lateral line, 45; above lateral line, 3; below, 9.

*Color* nearly uniform light, reddish brown, with no blotches. Scales finely *imbricate* with back.

Our description is based upon museum specimen No. 26228.

Among the other interesting forms collected in the same locality is a young specimen of *Hoplostethus mediterraneus*, and also a species of *Scorpana*, soon to be described.

#### METALLIC CASTINGS OF DELICATE NATURAL OBJECTS.

[Translated.]

The following process is recommended by Abbass for producing metallic castings of flowers, leaves, insects, &c. The object, a dead beetle for example, is first arranged in a natural position, and the feet are connected with an oval rim of wax. It is then fixed in the centre of a paper or wooden box by means of pieces of fine wire, so that it is perfectly free, and thicker wires are run from the sides of the box to the object, which subsequently serve to form air-channels in the mold by their removal. A wooden stick, tapering toward the bottom, is placed upon the back of the insect to produce a runner for casting. The box is then filled up with a paste of three parts of plaster of Paris, and one of brick-dust, made up with a solution of alum and sal ammoniac. It is also well first to brush the object with this paste to prevent the formation of air bubbles. After the mold thus formed has set, the object is removed from the interior by first reducing it to ashes. It is therefore dried slowly, and finally heated gradually to a red heat, and then allowed to cool slowly to prevent the formation of flaws or cracks. The ashes are removed by pouring mercury into the cold mold and shaking it thoroughly before pouring it out, and repeating this operation several times. The thicker wires are then drawn out, and the mold needs simply to be thoroughly heated before it is filled with metal in order that the latter may flow into all portions of it. After it has become cold it is softened and carefully broken away from the casting.

#### THE OCCURRENCE OF THE CANADA PORCUPINE IN MARYLAND.

By OTTO LUGGER.

Referring to the paper on the occurrence of the Canada Porcupine in West Virginia by Mr. Goode, in Vol. I, Proceedings U. S. National Museum, page 264, I wish to mention that this Porcupine, *Erethizon dorsatus*, is still, though rarely, found in Maryland. In the museum of the Maryland Academy of Sciences is a specimen from Alleghany

County, Maryland. Another specimen I saw living in confinement in the Blue Ridge Mountains, where it was caught two years ago. One was killed quite recently near Ellicott City, Maryland.

MARYLAND ACADEMY OF SCIENCES,

Baltimore, May 22, 1881.

#### NOTE ON THE LATILOID GENERA.

By THEODORE GILL.

In a late number of the Proceedings of the U. S. National Museum (Vol. IV, p. 53), Messrs. Jordan and Gilbert have accepted the name *Dekaya* instead of *Caulolatilus* for a genus of the family *Latilidae*, with a foot-note, "*Caulolatilus*, Gill: *nomen nudum*." In order that the adoption of this view may be at once arrested, it is advisable to give a history of those names.

In 1862, in the "Proceedings of the Academy of Natural Sciences of Philadelphia" (p. 240), the name *Caulolatilus* was proposed as the generic denomination of *Latilus chrysops* and its allies, in the following terms:

"The *Malacanthini* of Poey form a natural family. The *Latilus chrysops*, Val., does not, however, appear to be congeneric with the type of *Latilus*, but is distinguished by its form and the structure of the fins. It may be called *Caulolatilus chrysops*."

It will be thus seen (1) that the respects in which *Caulolatilus* differs from *Latilus* were indicated; (2) the relationships were exactly appreciated; (3) a specific type was mentioned. There could consequently be no doubt as to what was meant nor as to the characters by which it should be distinguished.

In 1864, in the "Proceedings of the California Academy of Natural Sciences" (Vol. 3, p. 70), Dr. Cooper proposed the name of *Dekaya* for a supposed new fish, concerning which he had not the slightest conception as to its proper relationships, considering it "to be a very aberrant form of the *Percoid* family, having many of the characters of other orders" [sic!], but that on the whole it seemed to be most nearly related to "the genus *Heterognathodon*, of Bleeker." The remarks respecting the "other orders" and the affinities indicated the most complete misapprehension as to the type. The description was equally at fault. The "general shape" was said to be "elongated and fusiform," although a shape less "fusiform" could scarcely be associated with moderate elongation. In other respects the description was faulty and erroneous or vague, but these lapses need not detain longer.

The question arises in such a case, What is the advantage of any description? According to the rules of the British and American associa-



tions for the advancement of science, a description is necessary as the basis of permanent nomenclature, but like many of the other rules propounded in those codes, there is no proper logical basis therefor. If a description is necessary, it is necessary that the description should be apt, but, as every naturalist is well aware, the description is completely ignored in practice. We adopt, for example, the name *Perca* and many others from Linnaeus and his successors, but inasmuch as those names were applied by older naturalists to forms that are now relegated to distinct families, it will be obvious that no regard whatever is paid to the *definitions*. This is recognized to such an extent that it is now admitted that a definition is only necessary to show that the writer had some idea as to what he was treating about. In the case in question, (1), on the one hand, it is evident from the words that the author of *Caulolatilus* did have an adequate idea as to both what he was writing of and as to the true distinctions of the fish considered, and (2), on the other hand, that the author of the name *Dekaya* had not the least conception of the nature of the form he described, and that the name originated simply from an almost inexcusable blunder and ignorance of the subject he ventured to write upon. There would therefore seem to be no doubt that in any case the name *Caulolatilus* should be retained in preference to *Dekaya*. But it so happens that there is no complication in the consideration of the choice of names even from the extreme standpoint from which it is viewed by Messrs. Jordan and Gilbert. The name *Dekaya* is inadmissible as the denomination of the *Latiloid* fish, if for no other reason, because the same name under the form *Dekayia* had been applied previously by Messrs. H. Milne Edwards and Haime to a genus of *Corals* of the family *Chaetidae*. (DEKAYIA, *H. Milne Edwards et J. Haime*, Monographie des Polypiers fossiles des Terrains Palæozoïques in Archives du Muséum d'Histoire Naturelle, t. 5, p. 154, 1851; *H. Milne Edwards*, Histoire Naturelle des Corallaires ou Polypes proprement dits, t. 3, p. 283, 1860.)

The history of the genus may therefore be epitomized as follows:

### CAULOLATILUS.

#### *Synonymy.*

- =*Caulolatilus Gill*, Proc. Acad. Nat. Sci. Phila., [v. 14,] p. 240, 1862. (Characters indicated.)
  - =*Dekaya Cooper*, Proc. Cal. Acad. Nat. Sci., v. 3, p. 70, 1864. (Described, but erroneously, and name preoccupied by Edwards and Haime in 1851.)
  - =*Caulolatilus Gill*, Proc. Acad. Nat. Sci. Phila., [v. 17,] p. 66, 1865. (Fully described.—Adopted by Cooper (later), Poey, Bleeker, Goode and Bean, Jordan & Gilbert (at first.)
  - =*Dekaya Jordan & Gilbert*, Proc. U. S. Nat. Mus., v. 4, p. 53, 1880. (Name revived for *Caulolatilus*.)
- latilus* sp. *Cuv. et Val., Günther, etc.*

Type *Caulolatilus chrysops*=*Latilus chrysops* C. & V.



The following genus is very nearly allied, viz:

### PROLATILUS.

#### *Synonymy.*

=*Prolatilus* Gill, Proc. Acad. Nat. Sci. Phila., [v. 17,] p. 67, 1865.

*latilus* sp. Cuv. & Val., *Jenyns*, *Günther*, etc.

Type *Prolatilus jugularis*=*Latilus jugularis* C. & V.

Apparently closely related to *Prolatilus* is *Pinguipes*, viz:

### PINGUIPES.

#### *Synonymy.*

=*Pinguipes* Cuv. & Val., Hist. Nat. des Poissons, t. 3, p. 277, 1829.

Type *Pinguipes brasiliensis* C. & V.

The following genus has been associated with the preceding by all who have treated of them, save Dr. P. von Bleeker. That ichthyologist has referred *Latilus* to the family of "Percoidae" and its tenth subfamily, "Spariformes" and "Phalanx Denticini," and removed *Caulolatilus* and *Prolatilus* from all close relationship therewith. "(Spec. plures familiae Parapercoid. adnumer.)" What are the exact affinities must be determined by a study of the anatomy.

### LATILUS.

#### *Synonymy.*

<*Latilus* Cuv. & Val., Hist. Nat. des Poissons, t. 5, p. 369, (t. 9, p. 495,) 1830.

=*Latilus* Gill, Proc. Acad. Nat. Sci. Phila., [v. 17,] p. 67, (by exclusion,) 1865.

=*Latilus* Bleeker, Archives Néerland. Sc. exactes et nat., t. 11, p. 279, 1876.

Type *Latilus simus*=*Coryphaena sima* Bl. Schneid.=*Latilus argentatus* C. & V.

To *Latilus* the following genus seems to be most nearly related, but whether such is really the case cannot be considered settled till its osteology is examined.

### LOPHOLATILUS.

#### *Synonymy.*

=*Lopholatilus* Goode & Bean, Proc. U. S. Nat. Mus., v. 2, p. 205, 1879.

Type *Lopholatilus chamaeleonticeps* Goode & Bean.

LIST OF SPECIES OF MIDDLE AND SOUTH AMERICAN BIRDS NOT  
CONTAINED IN THE UNITED STATES NATIONAL MUSEUM.

By ROBERT RIDGWAY.

[Corrected to July, 1881.]

[None of the species named in the following list are at present in the collection of the United States National Museum, and any of them that can be supplied by correspondents of the Museum, or of the Smithsonian Institution, will be very thankfully received.]

Family TURDIDÆ.

- Catharus aurantiirostris* (Hartl.). Venezuela.  
*mexicanus* Bp. Mexico to Veragua.  
*mentalis* ScL. et Salv. Bolivia.  
*phæopleurus* ScL. et Salv. Colombia.  
*alticola* Godm. et Salv. Guatemala.
- Turdus luridus* Bp. Colombia.  
*fumigatus* Licht. Venezuela to Brazil.  
*fuscater* Lafr. et d'Orb. Bolivia and Argentine Republic.  
*olivater* Lafr. Venezuela.  
*nigriceps* Jelski. Western Peru.  
*brunneus* Lawr. Upper Amazons.  
*leucops* Taczan. Northwestern Peru.  
*maranonius* Taczan. Northern Peru.
- Margarops sanctæ-luciæ* ScL. Sta Lucia, West Indies.  
*Harporhynchus ocellatus* ScL. Southwestern Mexico.
- Mimus dorsalis* (Lafr. et d'Orb.). Bolivia.  
*lividus* Licht. Eastern Brazil.  
*patachonicus* (Lafr. et d'Orb.). Patagonia and Arg. Rep.  
*trifasciatus* Gould. Galapagos.  
*parvulus* Gould. Galapagos.

Family PTILOGONATIDÆ.

- Myiadestes ardesiaceus* Less. Brazil.  
*griseiventer* Tschudi. Peru.  
*montanus* Cory. Haiti.
- Cichlopsis leucogonys* Cab. Brazil.

Family SYLVIIDÆ.

- Polioptila plumbeiceps* Lawr. Venezuela.

## Family TROGLODYTIDÆ.

- Campylorhynchus gularis* *Scl.* Mexico.  
                   *nuchalis* *Cab.* Venezuela and Trinidad.  
                   *variegatus* (*Gm.*). Brazil.  
                   *hypostictus* (*Gould.*) Upper Amazons and Colombia.  
                   *bicolor* *Pelz.* Guiana.
- Cinnicerthia peruana* (*Caban.*). Peru.
- Cyphorinus modulator* (*d'Orb.*). Amazons.  
                   *dichrous* *Scl. et Salv.* Colombia.
- Microcereulus bambla* (*Bodd.*). Guiana.  
                   *albigularis* *Scl.* Eastern Ecuador.  
                   *marginatus* *Scl.* Peru and Colombia.  
                   *squamatus* *Scl. et Salv.* Venezuela.  
                   *tæniatus* *Salv.* Western Ecuador.
- Thryophilus rufiventris* *Scl.* Interior of Brazil.  
                   *minor* (*Pelz.*). Interior of Brazil.  
                   *longirostris* (*Vicill.*). Brazil.  
                   *nisorius* *Scl.* Mexico.  
                   *fulvus* *Scl.* High Peru.
- Thryothorus coraya* (*Gm.*). Guiana and Amazonia.  
                   *mystacalis* *Scl.* Western Ecuador and Colombia.  
                   *euophrys* *Scl.* Western Ecuador.  
                   *cantator* *Jelski.* Central Peru.  
                   *selateri* *Taczan.* Northern Peru.
- Troglodytes tessellatus* *Lafr. et d'Orb.* Panama to Bolivia.
- Cistothorus graminicola* *Jelski.* Central Peru.  
                   *brunneiceps* *Salv.* Western Ecuador.  
                   *æquatorialis* *Lawr.* Ecuador.

## Family MOTACILLIDÆ.

- Anthus chii* *Vieill.* Southern Brazil and Uruguay.  
                   *nattereri* *Scl.* Southern Brazil.  
                   *peruvianus* *Nicholson.* Peru.  
                   *calcaratus* *Taczan.* Central Peru.  
                   *brevirostris* *Taczan.* Central Peru.

## Family MNIOTILTIDÆ.

- Dendroeca eoa* *Gosse.* Jamaica.
- Geothlypis speciosa* *Scl.* Eastern Mexico.  
                   *semiflava* *Scl.* Ecuador.  
                   *chiriquensis* *Salv.* Chiriqui.
- Basileuterus hypoleucus* *Bp.* Eastern Brazil.  
                   *bivittatus* (*Lafr. et d'Orb.*). Costa Rica to Bolivia.  
                   *griseiceps* *Scl. et Salv.* Venezuela.  
                   *cinereicollis* *Scl.* Colombia.

- Basileuterus mesoleucus* *Scl.* Guiana.  
*luteoviridis* *Bp.* Colombia.  
*leucophrys* *Natt.* Brazil.  
*euophrys* *Scl. et Salv.* Bolivia.  
*cabanisi* *Berlepsch.* Venezuela.  
*conspicillatus* *Salv. et Godm.* Colombia.  
*trifasciatus* *Stolz.* Northern Peru.  
*striaticeps* *Caban.* Central Peru.  
*diachlorus* *Caban.* Central Peru.  
*castaneiceps* *Scl. et Salv.* Western Ecuador.
- Setophaga brunneiceps* (*Lafr. et d'Orb.*). Bolivia.  
*ruficoronata* *Kaup.* Ecuador.  
*albifrons* *Scl. et Salv.* Venezuela.  
*flaveola* (*Lafr.*). Ecuador.  
*chrysops* *Salv.* Colombia.  
*melanocephala* *Tschudi.* Peru.  
*castaneocapilla* *Caban.* Guiana.
- Granatellus pelzelni* *Scl.* Amazons.

Family VIREONIDÆ.

- Hylophilus thoracicus* (*Max.*). Southeastern Brazil and Amazons.  
*pectoralis* *Scl.* Brazil to Guiana.  
*muscapinus* *Scl. et Salv.* Brazil to Guiana.  
*semibrunneus* *Lafr.* Colombia.  
*hypoxanthus* *Pelz.* Trinidad, Venezuela, and Amazons.  
*brunneiceps* *Scl.* Amazons and Guiana.  
*ferrugineifrons* *Scl.* Colombia and Amazons.  
*insularis* *Scl.* Tobago.  
*acuticauda* *Lawr.* Venezuela.  
*semicinereus* *Scl. et Salv.* Lower Amazons.  
*fuscapillus* *Scl. et Salv.* Ecuador.  
*flaviventris* *Caban.* Western Peru.
- Vireolanius eximius* *Baird.* Colombia.  
*chlorogaster* *Bp.* Amazons.
- Cyclorhis albiventris* *Scl. et Salv.* Eastern Brazil.  
*wiedi* *Pelz.* Southern Brazil.  
*virenticeps* *Scl.* Western Ecuador.  
*contrerasi* *Taczan.* Peru.  
*altirostris* *Salv.* Argentine Republic.

Family DULIDÆ.

- Dulus nuchalis* *Sic.* Antilles.

Family HIRUNDINIDÆ.

- Petrochelidon pyrrhonota* (*Vieill.*). Paraguay, Brazil, and Mexico.  
*Tachycineta andecola* *Lafr. et d'Orb.* Peru.

*Tachycineta leucopygia* *Stolz.* Northern Peru.

*Atticora melanoleuca* (*Max.*). Eastern Brazil.

*cinerea* (*Gm.*). Ecuador.

*tibialis* (*Cass.*). Peru and Panama.

*Cotile fucata* (*Temm.*). Brazil and Argentine Republic.

#### Family CÆREBIDÆ.

*Diglossa major* *Cab.* Guiana.

*carbonaria* (*Lafr. et d'Orb.*). Bolivia.

*gloriosa* *Scl. et Salv.* Venezuela.

*glauca* *Scl. et Salv.* Bolivia.

*pectoralis* *Caban.* Central Peru.

*mystacalis* *Lafr.* Andes of Bolivia.

*Diglossopsis cærulescens* *Scl.* Venezuela to Ecuador.

*Oreomanes fraseri* *Scl.* Ecuador.

*Conirostrum ferrugineiventre* *Scl.* Bolivia.

*atrocyanea* *Lafr.* Bolivia.

*cyaneum* *Taczan.* Central Peru.

*Xenodaenis parina* *Caban.* Peru.

*Dacnis analis* *Lafr. et d'Orb.* Upper Amazons and Guiana.

*xanthophthalma* *Jelski.* Central Peru.

*modesta* *Caban.* Peru.

*Dacnidea leucogastra* *Taczan.* Central Peru.

*Certhidea fusca* *Scl. et Salv.* Galapagos.

*Chlorophanes purpurascens* *Scl. et Salv.* Venezuela.

*Certhiola caboti* *Baird.* Yucatan (Cozumel I.).

*maguirostris* *Taczan.* Northern Peru.

#### Family TANAGRIDÆ.

*Chlorophonia frontalis* *Scl.* Venezuela.

*flavirostris* *Scl.* Ecuador.

*pretrei* (*Lafr.*). Colombia.

*Euphonia selateri* *Sund.* Porto Rico.

*trinitatis* *Strickl.* Trinidad and coast-region of Venezuela and Colombia.

*minuta* *Cab.* Guiana to Guatemala.

*ruficeps* *Lafr. et d'Orb.* Bolivia, Amazons, and Venezuela.

*vittata* *Scl.* Brazil.

*gnatho* *Cab.* Costa Rica.

*chrysopasta* *Scl. et Salv.* Upper Amazons and Venezuela.

*chalcopasta* *Scl. et Salv.* Colombia.

*cayana* (*Linn.*). Guiana and Amazons.

*plumbea* *Du Bus.* Amazons.

*finschi* *Scl. et Salv.* Guiana.

*insignis* *Scl. et Salv.* Eastern Ecuador.

*Tanagrella calophrys* *Cab.* Guiana and Upper Amazons.



- Pipridea castaneiventris* *Scl.* Bolivia.
- Calliste fastuosa* (*Less.*). Brazil.  
*florida* *Scl. et Salv.* Costa Rica.  
*graminea* (*Spix*). Guiana.  
*cucullata* (*Sw.*). Venezuela.  
*cyanoptera* (*Sw.*). Venezuela.  
*lavinia* *Cass.* Panama to Nicaragua.  
*albiventris* *Gray.* Guiana.  
*atrocaerulea* (*Tsch.*). Peru and Bolivia.  
*cabanisi* *Scl.* Western Guatemala  
*argentea* (*Tsch.*). Peru.  
*rufigenis* *Scl.* Venezuela.  
*hartlaubi* *Scl.* Colombia.  
*xanthocephala* (*Tsch.*). Peru and Bolivia.  
*fulvicervix* *Scl. et Salv.* Bolivia.  
*argyrofenges* *Scl. et Salv.* Bolivia.  
*punctulata* *Scl. et Salv.* Bolivia.  
*melanotis* *Scl. et Salv.* Eastern Ecuador.  
*albertinae* *Pelz.* Brazil.
- Iridornis reinhardti* *Scl.* Peru.  
*jelskii* *Caban.* Peru.
- Pæcilothraupis igniventris* (*Lafr. et d'Orb.*). Bolivia.  
*lacrymosa* (*Du Bus*). Peru.  
*melanogenys* *Salv. et Godm.* Colombia.  
*ignicrissa* *Caban.* Central Peru.
- Buthraupis montana* (*Lafr. et d'Orb.*). Bolivia.  
*edwardsi* *Elliot.* (Hab. ignot.)
- Compsocoma sumptuosa* (*Less.*). Venezuela to Peru.  
*flavinucha* (*Lafr. et d'Orb.*). Bolivia.
- Dubusia selysia* *Bp.* Ecuador.
- Tanagra olivina* *Scl.* Interior of Brazil, Peru, and Colombia.
- Spindalis zena* (*Linn.*). Bahamas.
- Ramphocelus ephipialis* *Scl.* Upper Amazons.  
*uropygialis* *Bp.* Guatemala.  
*chrysonotus* *Lafr.* Colombia.
- Pyranga erythrocephala* (*Sw.*). Mexico.  
*roseigularis* *Cabot.* Yucatan.
- Orthogonys cyanipectus* (*Vieill.*). Guiana.
- Lamprotes alboeristatus* *Lafr.* Colombia.
- Phænicothraupis gutturalis* *Scl.* Colombia.
- Lanio versicolor* (*Lafr. et d'Orb.*). Bolivia and Peru.
- Eucometis penicillata* (*Spix*). Guiana and Amazons.  
*albicollis* (*Lafr. et d'Orb.*). Interior of Brazil and Bolivia.  
*spodocephala* (*Bp.*). Veragua to Guatemala.
- Tachyphonus phæniceus* *Sw.* Upper Amazons.  
*rufiventris* (*Spix*). Upper Amazons.

*Tachyphonus intercedens Berlepsch.* Trinidad.

*Nemosia peruana (Bp.).* Upper Amazons.

*ruficeps (Lafr. et d'Orb.).* Bolivia.

*fulvescens Strickl.* Brazil and Amazons.

*sordida (Lafr. et d'Orb.).* Bolivia.

*ornata ScL.* Western Ecuador.

*fulviceps (Cab.).* Venezuela.

*inornata Taczan.* Northern Peru.

*chrysopsis ScL. et Salv.* Ecuador.

*Pyrrhocomma ruficeps (Strickl.).* Southern Brazil and Paraguay.

*Chlorospingus flavipectus (Lafr.).* Colombia.

*atripileus (Lafr.).* Colombia and Ecuador.

*melanotis ScL.* Colombia.

*oleagineus ScL.* Colombia.

*verticalis (Lafr.).* Colombia.

*lichtensteini ScL.* Colombia.

*castaneicollis ScL.* Eastern Peru.

*goeringi ScL. et Salv.* Venezuela.

*ealophrys ScL. et Salv.* Bolivia.

*cinereocephalus Jelski.* Central Peru.

*chrysogaster Taczan.* Central Peru.

*chrysophrys ScL. et Salv.* Venezuela.

*olivaceus (Bonap.).* Guatemala.

*berlepschi Taczan.* Central Peru.

*nigrifrons Lawr.* Ecuador.

*auricularis Caban.* Peru.

*phæocephalus ScL. et Salv.* Western Ecuador.

*Buarremon torquatus (Lafr. et d'Orb.).* Bolivia.

*phæopleurus ScL.* Venezuela.

*rufinuchus (Lafr. et d'Orb.).* Bolivia.

*leucopterus (Jard.).* Ecuador.

*albifrenatus (Boiss.).* Colombia.

*meridæ ScL. et Salv.* Venezuela.

*schistaceus (Boiss.).* Colombia and Ecuador.

*semirufus (Boiss.).* Venezuela and Colombia.

*fulviceps (Lafr. et d'Orb.).* Bolivia.

*castaneiceps ScL.* Ecuador.

*specularis Salv.* Northern Peru.

*tricolor Taczan.* Central Peru.

*melanops ScL. et Salv.* Bolivia.

*taczanowskii ScL. et Salv.* Peru.

*castaneifrons ScL. et Salv.* Interior of Venezuela.

*elæoprorus ScL. et Salv.* Colombia.

*melanolæmus ScL. et Salv.* Southern Peru.

*spodionotus ScL. et Salv.* Ecuador.

*comptus ScL. et Salv.* Ecuador.



- Spermophila enleri Caban.* Southeastern Brazil.  
*Neorhynchus nasesus Bp.* Western Peru.  
*Camarhynchus crassirostris Gould.* Galapagos Islands.  
     *psittaculus Gould.* Galapagos Islands.  
     *variegatus Sel. et Salv.* Galapagos Islands.  
     *habeli Sel. et Salv.* Galapagos Islands.  
     *prostheinelas Sel. et Salv.* Galapagos Islands.  
     *cinereus (Lafr.).* Northern and Eastern Peru.  
*Caetornis assimilis Gould.* Galapagos Islands.  
     *abingdoni Sel. et Salv.* Galapagos Islands.  
     *pallida Sel. et Salv.* Galapagos Islands.  
*Dolospingus nuchalis Elliot.* Orinoco River.  
*Phoniopara fumosa Lawr.* Trinidad.  
*Haplospiza uniformis Sel. et Salv.* Mexico.  
*Paroaria capitata (Lafr. et d'Orb.).* Paraguay and Argentine Republic.  
*Coryphospingus griseocristatus (Lafr. et d'Orb.).* Bolivia.  
*Porphyrospiza cyanella (Sparm.).* Interior of Brazil.  
*Tiaris ornata (Max.).* Brazil.  
*Xenospingus concolor (Lafr. et d'Orb.).* Peru.  
*Poospiza ornata (Landb.).* Argentine Republic (Mendoza).  
     *torquata (Lafr. et d'Orb.).* Bolivia and Argentine Republic  
     (Mendoza).  
     *bonapartei Sel.* Western Peru.  
     *cinerea Bp.* Brazil.  
     *melanoleuca Vieill.* Argentine Republic and Paraguay.  
     *cæsar Sel. et Salv.* Peru.  
     *hypochondriaca (D'Orb. et Lafr.).* Bolivia.  
*Spodiornis jardinei Sel.* Ecuador.  
*Phrygilus atriceps (Lafr. et d'Orb.).* Bolivia and Peru.  
     *ocularis Sel.* Ecuador.  
     *plebeius Cab.* Peru and Argentine Republic.  
     *melanoderus (Quoy et Gaim.).* Falkland Islands and Patagonia.  
     *erythronotus (Phil. et Landb.).* Chili.  
*Diuca minor Bp.* Patagonia.  
     *speculifera (Lafr. et d'Orb.).* Bolivia and Peru.  
*Catamenia homochroa Sel.* Ecuador and Colombia.  
     *inornata (Lafr.).* Bolivia.  
*"Zonotrichia" quinquistriata Sel. et Salv.* Mexico.  
     *strigiceps Gould.* Patagonia.  
     *canicapilla Gould.* Patagonia.  
*Spizella pinetorum Salv.* Guatemala.  
*Peucea notostieta Sel. et Salv.* Mexico.  
*Ammodromus peteniensis Salv.* Guatemala.  
*Coturniculus peruanus Bp.* Bolivia and Upper Amazons to Colombia.  
*Saltatricula multicolor Burm.* Argentine Republic.

- Embernagra olivascens* (Lafr. et d'Orb.). Bolivia and Argentine Republic (Mendoza).  
*superciliosa* Salv. Costa Rica.  
*Emberizoides melanotis* Temm. Southern and Eastern Brazil.  
*Hæmophila sumichrasti* Lawr. Western Mexico.  
*humeralis* Cab. Mexico.  
*stolzmanni* Taczan. Northern and Western Peru.  
*Pipilo mystacalis* Taczan. Central Peru.  
*Pyrgisoma kieneri* Bp. Mexico.  
*Chrysomitris atrata* (Lafr. et d'Orb.). Bolivia and Peru.  
*spinescens* Bp. Colombia.  
*atriceps* Salv. Guatemala.  
*capitalis* Caban. Central Peru.  
*Sycalis flaveola* (Linn.). Columbia to South Brazil.  
*columbiana* Cab. Venezuela, Guiana, and Lower Amazons.  
*luteola* (Sparm.). Colombia to Chili and Argentine Republic.  
*chrysops* Sel. Mexico and Guatemala.  
*lutea* (Lafr. et d'Orb.). Bolivia and Peru.  
*luteocephala* (Lafr. et d'Orb.). Bolivia.  
*uropygialis* (Lafr. et d'Orb.). Bolivia.  
*raimondi* Jelski. Western Peru.

Family ICTERIDÆ.

- Clypeicterus oseryi* Deville. Upper Amazons.  
*Ostinops bifasciatus* (Spix). Lower Amazons.  
*atrovirens* (Lafr. et d'Orb.). Colombia and Amazons to Bolivia.  
*atrocastaneus* Caban. Peru.  
*Cassicus chrysonotus* D'Orb. et Lafr. Bolivia.  
*Icterus cayanensis* (Linn.). Guiana.  
*maculi-alatus* Cassin. Guatemala.  
*Molothrus purpurascens* Hahn. Western Peru.  
*discolor* (Cassin). Venezuela and Colombia.  
*Agelæus cyanopus* (Vieill.). South Brazil and Paraguay.  
*Lampropsar guianensis* (Cab.). Guiana and Venezuela.  
*warszewiezi* Cab. Ecuador and Peru.  
*Quiscalus assimilis* Sel. Veragua to Colombia.  
*lugubris* Sw. Guiana and Trinidad.  
*subalaris* Boiss. Colombia and Venezuela.

Family CORVIDÆ.

- Xanthura yncas cæruleocephala* (Dubois). Venezuela and Trinidad.  
*Cyanolyca viridicyanea* (Lafr. et d'Orb.). Bolivia and Peru.  
*jolyæa* (Bp.). Peru.  
*armillata* (Gray). Colombia and Venezuela.  
*meridana* (Sel. et Salv.). Venezuela.  
*bogotana* (Sel. et Salv.). Bogota.



- Aphelocoma ultramarina* (*Bp.*). Mexico.  
*Cyanocorax cayanus* (*Linn.*). Guiana.  
     *diesingi Pelz.* Brazil.  
     *sclateri Heine.* Colombia.  
     *intermedius Heine.* Venezuela.  
     *chilensis (Bonap.).* Bolivia and Chili.  
     *inexpectatus Elliot.* Brazil.  
     *heckeli Pelz.* Brazil.  
     *flavigastra (Lath.).* Trinidad to Colombia; Guiana?  
*Cissolopha germana (Sel. et Salv.).* Belize, Peten, and Merida (Yucatan).  
*Psilorhinus cyanogenys Gray.* Coast of Honduras.  
*Corvus minutus Gundl.* Cuba.  
     *solitarius Würt.* St. Domingo.

## Family OXYRHAMPIDÆ.

- Oxyrhamphus flammiceps (Temm.).* Brazil.

## Family TYRANNIDÆ.

- Conopophaga aurita (Gm.).* Guiana.  
     *torrida Sel.* Eastern Ecuador.  
     *peruviana Des Murs.* Eastern Ecuador and Amazons.  
     *gutturalis Sel.* Colombia.  
     *castaneiceps Sel.* Peru and Colombia.  
     *ardesiaca Lafr. et d'Orb.* Bolivia and Upper Amazons.  
     *melanogastra Ménétr.* Interior of Brazil and Amazons.  
     *maximiliani Cab.* Southern Brazil (Rio).  
*Corythopsis anthoides (Puch.).* Guiana.  
     *humivagans Jelski.* Central Peru.  
     *nigro-cincta (D'Orb. et Lafr.).* Bolivia.  
*Agriornis pollens Sel.* Ecuador.  
     *solitaria Sel.* Ecuador.  
     *insolens Sel. et Salv.* High Peru.  
*Myiotheretes erythropgia Sel.* Ecuador.  
*Tanioptera velata Licht.* Southern Brazil and Bolivia.  
     *murina (Lafr. et d'Orb.).* Patagonia.  
     *rubetra Burm.* Argentine Republic and Patagonia.  
     *australis Philippi.* Patagonia.  
*Ochthodietæ fumigata (Boiss.).* High Colombia.  
     *signatus Taczan.* Central Peru.  
     *fuscus Sel. et Salv.* Bolivia and interior of Peru.  
*Ochthæca fumicolor Sel.* Colombia and Ecuador.  
     *superciliosa Sel. et Salv.* High Venezuela.  
     *cenanthoides (Lafr. et d'Orb.).* High Bolivia.  
     *polionota Sel. et Salv.* High Peru.  
     *leucophrys (Lafr. et d'Orb.).* High Bolivia.

- Oechthœca albidinema* (*Lafr.*). Colombia.  
*rufipectoralis* (*Lafr. et d'Orb.*). Bolivia.  
*rufimarginata* *Lawr.* Ecuador and Colombia.  
*nigrita* *Scl. et Salv.* Venezuela.  
*cinnamomeiventris* (*Lafr.*). Colombia.  
*diadema* (*Hartl.*). Colombia.  
*gratiosa* *Scl.* Ecuador.  
*murina* *Scl.* Guiana.  
*pulchella* *Scl. et Salv.* Bolivia.  
*arenacea* *Scl. et Salv.* Interior of Colombia.  
*salvini* *Taczan.* Peru.  
*leucometopa* *Scl. et Salv.* Western Peru.  
*thoracica* *Jelski.* Central Peru.  
*poliogastra* *Salv. et Godm.* High Colombia.  
*tanioptera* (*Caban.*). Peru.
- Sayornis latirostris* *Cab.* Ecuador.
- Fluvicola pica* (*Bodd.*). Guiana.  
*climacura* (*Vieill.*). Brazil.  
*atripennis* *Scl.* Western Ecuador.
- Cnipolegus nigerrimus* (*Vieill.*). Brazil.  
*aterrimus* *Kaup.* Bolivia.  
*anthracinus* *Heine.* Argentine Republic (Mendoza).  
*unicolor* *Kaup.* Upper Amazons.  
*hudsoni* *Scl.* Patagonia.  
*pusillus* *Scl. et Salv.* Amazons.
- Muscisaxicola albifrons* *Tsch.* Peru.  
*fluviatilis* *Scl. et Salv.* Peru.  
*rufipennis* *Jelski.* Central Peru.
- Platyrrhynchus rostratus* (*Lath.*). Brazil.  
*flavigularis* *Scl.* Colombia.  
*senex* *Scl. et Salv.* Ecuador.
- Todirostrum chrysocrotaphum* *Strickl.* Amazons.  
*guttatum* *Pelz.* Interior of Guiana and Colombia.  
*calopterus* *Scl.* Eastern Ecuador.  
*picatum* *Scl.* Eastern Ecuador.  
*capitale* *Scl.* Eastern Ecuador.  
*pulchellum* *Scl.* High Peru.  
*rufigene* *Scl. et Salv.* Ecuador.  
*signatum* *Scl. et Salv.* Amazons.
- Euscarthmus nidipendulus* (*Max.*). Brazil.  
*fumifrons* (*Hartl.*). Brazil.  
*gularis* (*Temm.*). Brazil.  
*grenadensis* (*Hartl.*). Colombia.  
*striaticollis* (*Lafr.*). Brazil.  
*impiger* *Scl. et Salv.* Colombia and Venezuela.  
*wuchereri* *Scl. et Salv.* Brazil.

- Eusearthmus fulviceps* *Scl.* Peru and Western Ecuador.  
     *spicifer* (*Lafr.*). Upper Amazons.  
     *ocularis* *Salv.* Western Ecuador.  
     *rufigularis* *Caban.* Western Peru.  
     *pyrrhops* *Caban.* Peru.  
     *pelzelni* *Scl. et Salv.* Brazil (Cuyuba).
- Orchilus auricularis* (*Vieill.*). Brazil.  
     *ecaudatus* (*Lafr. et d'Orb.*). Bolivia, Venezuela, and Costa Rica.
- Colopterus galeatus* (*Bodd.*). Guiana and Venezuela.  
*Hapalocereus acutipennis* *Scl. et Salv.* Colombia and Peru.  
*Habrura minima* (*Gould.*). Uruguay.  
*Pogonotriccus eximius* (*Temm.*). Brazil.  
     *ophthalmicus* *Taczan.* Central Peru.
- Leptotriccus sylvia* *Cab.* Brazil.  
     *superciliaris* *Scl. et Salv.* Veragua.
- Ceratotriccus furcatus* (*Lafr.*). Southeastern Brazil.  
*Stigmatura flavo-cinerea* (*Burm.*). Argentine Republic.  
*Serpophaga subflava* *Scl. et Salv.* Brazil (Para).  
     *parvirostris* *Gould.* Chili.  
     *pæciloerca* *Scl. et Salv.* Ecuador and Colombia.  
     *albogrisea* *Scl. et Salv.* Ecuador.
- Anæretes fernandezianus* *Philippi.* Island of Juan Fernandez.  
     *agilis* *Scl.* Colombia.  
     *flavirostris* *Scl. et Salv.* Bolivia.
- Leptopogon peruvianus* *Scl. et Salv.* Upper Amazons.  
     *erythrops* *Scl.* Colombia.  
     *pæcilotis* *Scl.* Colombia.  
     *auritus* *Jelski.* Central Peru.  
     *tristis* *Scl. et Salv.* Bolivia.  
     *minor* *Taczan.* Northern Peru.
- Phyllomyias brevirostris* *Spir.* Brazil.  
     *burmeisteri* *Cab. et Hein.* Brazil.  
     *semifusca* *Scl.* Guiana to Colombia; Brazil.  
     *platyrhyncha* *Scl. et Salv.* Interior of Brazil.  
     *tumbezana* *Taczan.* North Peru.  
     *cinereicapilla* *Caban.* Western Peru.
- Ornithion inerme* *Hartl.* Guiana.  
     *obsoletum* (*Max.*). Brazil.
- Tyrannisens cinereiceps* *Scl.* Colombia and Ecuador.  
     *chrysops* *Scl.* Colombia and Ecuador.  
     *improbis* *Scl. et Salv.* Venezuela and Colombia.  
     *leucogonys* *Scl. et Salv.* Colombia.  
     *gracilipes* *Scl.* Eastern Peru and Upper Amazons.  
     *griseiceps* *Scl. et Salv.* Ecuador.  
     *viridissimus* *Scl.* Central Peru.

- Tyranneutes brachyurus* *Scl. et Salv.* British Guiana.  
*Elainea gigas* *Scl.* Eastern Ecuador.  
     *pallatangæ* *Scl.* Western Ecuador.  
     *fallax* *Scl.* Jamaica.  
     *elegans* *Pelz.* Amazons, Colombia, and Guiana.  
     *caniceps* *Siv.* Amazons, Colombia, and Panama.  
     *ruficeps* *Pelz.* Interior of Guiana and Amazons.  
     *obscura* (*Lafr. et d'Orb.*). Brazil and Bolivia.  
     *mesolenca* *Cab. et Hein.* Brazil.  
     *arenarum* *Salv.* Costa Rica.  
     *affinis* *Burm.* Interior of Brazil.  
     *leucospodia* *Taczan.* Northern Peru.  
*Sublegatus glaber* *Scl. et Salv.* Venezuela.  
     *murinus* (*Spir.*). Lower Amazons.  
*Myiozetetes rufipennis* *Lawr.* Venezuela.  
     *similis* (*Spir.*). Brazil, Peru, and Ecuador.  
     *luteiventris* *Scl.* Eastern Ecuador, Upper Amazons, and Guiana.  
*Rhyneocyclus olivaceus* (*Temm.*). Brazil.  
     *fulvipectus* *Scl.* Western Ecuador.  
     *viridiceps* *Scl. et Salv.* Upper Amazons.  
     *megacephalus* *Siv.* Brazil and Amazons.  
     *peruvianus* *Taczan.* Central Peru.  
*Conopias inornata* (*Lawr.*). Venezuela and Trinidad.  
     *cinchoneti* (*Tech.*). Peru and Colombia.  
*Pitangus gabbi* *Lawr.* St. Domingo.  
*Sirystes sibilator* (*Vieill.*). Brazil.  
     *albogriseus* *Lawr.* Panama, Colombia, and Amazons.  
     *albicinereus* *Scl. et Salv.* Upper Amazons and Colombia.  
*Myiodynastes hemichrysus* (*Cab.*). Veragua and Costa Rica.  
*Muscivora swainsoni* *Pelz.* Eastern Brazil.  
     *castelnaudi* (*Dev.*). Upper Amazons.  
*Hirundinea selateri* *Reinh.* Eastern Peru and Colombia.  
*Myiobius vieillotides* (*Lafr.*). Venezuela.  
     *pulcher* *Scl.* Ecuador.  
     *rufescens* *Salv.* Western Peru.  
     *capitalis* *Salv.* Costa Rica.  
     *aureiventris* *Scl.* High Peru.  
     *superciliosus* *Taczan.* Central Peru.  
     *stellatus* *Caban.* Ecuador.  
*Empidochanes fringillaris* *Pelz.* South Brazil.  
     *pæcilurus* *Scl.* Colombia and Peru.  
*Mitrephorus ochraceiventris* *Caban.* Western Peru.  
*Empidonax griseigularis* *Lawr.* Panama and Western Ecuador.  
     *atriceps* *Salvin.* Veragua.  
     *andinus* *Taczan.* Central Peru.

- Empidonax pectoralis Lawr.* Central Mexico.  
*Contopus ardesiacus (Lafr.)*. Venezuela to Ecuador.  
     *ochraceus ScL. et Salv.* Costa Rica.  
     *brachytarsus ScL.* Mexico to Colombia; Amazons.  
     *schotti Lawr.* Yucatan.  
*Blacicus blancoi Gundl.* Porto Rico.  
*Myiochanes cinereus (Spix.)*. Brazil, Amazons, and Ecuador.  
     *nigrescens ScL. et Salv.* Ecuador.  
*Myiarchus magnirostris (Gray)*. Galapagos Island.  
     *semirufus ScL. et Salv.* Peru.  
     *cephalotes Stolz.* Peru.  
     *apicalis ScL. et Salv.* Interior of Colombia.  
*Tyrannus niveigularis ScL.* Western Ecuador.  
     *albigularis Burm.* Eastern Brazil.  
     *aurantio-atro-cristatus Lafr. et d'Orb.* Argentine Republic,  
     Bolivia, and Eastern Peru.  
     *apolites (Cab. & Hein.)*. (Hab. ignot).

## Family PIPRIDÆ.

- Piprites pileatus (Temm.)*. Brazil.  
     *chloris (Temm.)*. Brazil.  
     *chlorion (Cab.)*. Guiana, Amazons, and Colombia.  
     *griseiceps Salv.* Costa Rica.  
     *tshudü Caban.* Peru.  
*Xenopipo atronitens Cab.* Guiana and Colombia.  
*Pipra heterocerca ScL.* Amazons.  
     *flavieollis ScL.* Amazons.  
     *fasciata Lafr.* Amazons, interior of Brazil, Peru, and Bolivia.  
     *cornuta Spix.* Upper Amazons.  
     *nattereri ScL.* Amazons.  
     *cæruleocapilla Tsch.* Peru.  
     *virescens Pelz.* Amazons.  
*Neopipo cinnamomea Lawr.* Upper Amazons.  
*Machæropterus pyrocephalus ScL.* Amazons and interior of Brazil.  
*Chiroxiphia regina ScL.* Upper Amazons.  
*Metopothrix aurantiaca ScL. et Salv.* Upper Amazons.  
*Chiromachæris coronata Bouc.* Colombia.  
*Heteropelma turdinum (Max.)*. Brazil.  
     *wallacei ScL. et Salv.* Lower Amazons.  
     *amazonum ScL.* Upper Amazons and Colombia.  
     *stenorhynchum ScL. et Salv.* Venezuela.  
     *virescens (Max.)*. Brazil.  
     *flavicapillum ScL.* Brazil.  
     *chrysocephalum Pelz.* Interior of Brazil and Amazons.  
     *aurifrons (Max.)*. Brazil.



- Heterocercus linteatus Strickl.* Upper Amazons.  
*flavivertex Pelz.* Interior of Guiana.  
*aurantiivertex Sel. et Salv.* Ecuador.  
*Schiffornis major Bp.* Upper Amazons.  
*rufa Pelz.* Interior of Brazil.

Family COTINGIDÆ.

- Titiria inquisitor (Olf.).* Brazil and Guiana.  
*inquisitrix Sel. et Salv.* Bolivia.  
*Hadrostomus homochrous Sel.* Western Ecuador and Panama.  
*audax Caban.* Western Peru.  
*Pachyrhamphus surinamus (Linn.).* Guiana.  
*spodiurus Sel.* Western Ecuador.  
*niger Spix.* Guiana, Amazons, Trinidad, and Colombia.  
*intermedius Berlepsch.* Venezuela.  
*Lathria plumbea (Licht.).* Brazil.  
*subalaris Sel.* Upper Amazons.  
*cryptolopha Sel. et Salv.* Western Ecuador.  
*Chirocylla uropygialis Sel. et Salv.* Bolivia.  
*Aulia hypopyrrha (Vieill.).* Brazil.  
*lateralis Gray et Mitch.* Upper Amazons.  
*Lipaugus immundus Sel. et Salv.* Interior of Guiana.  
*Ptilochloris squamata (Max.).* Brazil.  
*buckleyi Sel. et Salv.* Ecuador.  
*Attila brasiliensis Less.* Brazil.  
*spadiceus (Gm.).* Guiana.  
*citriniventris Sel.* Upper Amazons.  
*validus Pelz.* Interior of Brazil.  
*thamnophiloides (Spix.).* Guiana and Upper Amazons.  
*Casiornis fusca Sel. et Salv.* Brazil (Bahia).  
*Tijuca nigra Less.* Brazil.  
*Pipreola melanolæma Boiss.* Venezuela, Ecuador, and Peru.  
*aureipectus Lafr.* Venezuela and Colombia.  
*chlorolepidota Sw.* Western Ecuador.  
*sclateri Corn.* Ecuador.  
*formosa Hartl.* Venezuela.  
*viridis (d'Orb. et Lafr.).* Bolivia and Peru.  
*lubomirskii Taczan.* Northern Peru.  
*elegans Sel.* Middle Peru.  
*frontalis Sel.* Bolivia.  
*Ampelio melanocephalus Sw.* Brazil.  
*Heliochera rufaxilla (Tsch.).* Eastern Peru and Colombia.  
*Cotinga cincta (Bodd.).* Eastern Brazil.  
*Xipholena lamellipennis (Lafr.).* Lower Amazons.  
*Iodopleura laplacei Eyd. et Gerv.* Guiana.

- Doliornis sclateri Taczan.* Central Peru.  
*Pyroderus orenocensis (Lafr.)* Venezuela.  
*Cephalopterus penduliger Sel.* Western Ecuador.  
*Phytotoma angustirostris Lafr. et d'Orb.* Bolivia.

## Family DENDROCOLAPTIDÆ.

- Geobates pœcilopterus (Max.)* Southern Brazil.  
*Geositta crassirostris Sel.* Western Peru.  
     *fasciata (Phil. et Landb.)* Chili.  
     *peruviana Lafr.* Western Peru.  
     *saxicolina Taczan.* Central Peru.  
*Furnarius agnatus Sel. et Salv.* Colombia.  
     *assimilis Cab. et Hein.* Southern and Eastern Brazil.  
     *minor Pelz.* Amazons.  
     *commersoni Pelz.* Southern Brazil and Bolivia.  
     *pileatus Sel. et Salv.* Lower Amazons.  
*Clibanornis dendrocolaptoides (Pelz.)* South Brazil.  
*Upucerthia ruficauda (Meyen)* Chili and Argentine Republic.  
     *luscini (Burm.)* Argentine Republic.  
     *serrana Taczan.* Central Peru.  
     *jelskii (Cab.)* Central Peru.  
*Cinclodes antarcticus (Garn.)* Falkland Islands.  
     *bifasciatus Sel.* Bolivia and Argentine Republic;  
     *rivularis Caban.* Central Peru.  
*Lochmias sororia Sel. et Salv.* Venezuela.  
     *obscurata Cab.* Bolivia.  
*Sclerurus umbretta (Licht.)* Brazil.  
     *albigularis Sw.* Venezuela.  
     *olivascens Caban.* Western Peru.  
*Oxyurus masafueræ (Ph. et Landb.)* Masafuera Island.  
*Sylviorthorhynchus desmursi Gay.* Chili.  
*Phlæoceryptes schœnobænnus Cab.* Peru.  
*Leptasthenura setaria (Temm.)* Southern Brazil.  
     *striolata (Pelz.)* Interior of Brazil.  
     *andicola Sel.* High Ecuador.  
     *fuliginiceps (Lafr. et d'Orb.)* Argentine Republic.  
*Synallaxis mæsta Sel.* Ecuador and Colombia.  
     *hypospodia Sel.* Brazil.  
     *subpudica Sel.* Colombia.  
     *gnianensis (Gm.)* Guiana, Colombia, and Lower Amazons.  
     *albilora Pelz.* Interior of Brazil and Bolivia.  
     *cinerascens Temm.* Brazil.  
     *propinqua Pelz.* Amazons.  
     *stictothorax Sel.* Ecuador.  
     *semicinerea Reich.* Brazil.

*Synallaxis* *scutata* *Scl.* Brazil.

*vulpina* *Pelz.* Interior of Brazil and Amazons.

*unirufa* *Lafr.* Colombia.

*castanea* *Scl.* Venezuela.

*kollari* *Pelz.* Interior of Guiana.

*laemostieta* *Scl.* Colombia.

*terrestris* *Jard.* Tobago and Trinidad.

*gularis* *Lafr.* Colombia and Ecuador.

*fuliginosa* *Lafr.* Colombia.

*palpebralis* *Cab.* Peru.

*torquata* (*Max.*). Southern Brazil.

*maximiliani* *d'Orb.* Bolivia.

*rutilans* *Temm.* Amazons.

*brunneicaudalis* *Scl.* Western Ecuador and Western Peru.

*mustelina* *Natt.* Eastern Peru and River Madeira.

*fruticicola* *Taczan.* Peru.

*rufipennis* *Scl. et Salv.* Bolivia.

*maranonica* *Tacz.* North Peru.

*tithys* *Taczan.* Peru.

*pallida* *Max.* Brazil.

*antisiensis* *Scl.* Ecuador.

*curtata* *Scl.* Colombia.

*rufigenis* *Laur.* Costa Rica.

*hypostieta* *Pelz.* Interior of Guiana.

*subcristata* *Scl.* Venezuela.

*ruticilla* *Cab. et Hein.* Southern Brazil.

*albiceps* (*Lafr. et d'Orb.*). Bolivia.

*albicapilla* *Cab.* Peru.

*humicola* *Kittl.* Chili and Argentine Republic.

*orbignyi* *Reichenb.* Bolivia and Argentine Republic.

*arequipæ* *Scl. et Salv.* Western Peru.

*humilis* *Cab.* Western Peru.

*patagonica* (*Lafr. et d'Orb.*). Patagonia.

*wyatti* *Scl.* Colombia.

*flammulata* *Jard.* High Ecuador and Colombia.

*pudibunda* *Scl.* Central Peru.

*graminicola* *Jelski.* Central Peru.

*virgata* *Jelski.* Central Peru.

*Placellodomus* *striaticeps* (*Lafr. et d'Orb.*). Bolivia and Peru.

*sibilator* *Doring.* Argentine Republic (Cordova) and Bolivia.

*Thripophaga* *guttuligera* *Scl.* Colombia.

*Homorus* *unirufus* (*Lafr. et d'Orb.*). Bolivia.

*gutturalis* (*Lafr. et d'Orb.*). Bolivia and Argentine Republic.

*Thripadectes* *flammulatus* (*Eyt.*). Colombia.

*scrutator* *Jelski.* Central Peru.

- Automolus ferruginolentus* (Max.). Brazil.  
     *melanopezus* *Scl.* Eastern Ecuador.  
     *scilateri* *Pelz.* Amazons.  
     *subulatus* (*Spix*). Amazons.  
     *holostictus* *Scl. et Salv.* Colombia.  
     *striaticeps* *Scl. et Salv.* Interior of Colombia and Peru.  
     *ignobilis* *Scl. et Salv.* Colombia.  
     *dorsalis* *Scl. et Salv.* Ecuador.  
     *stictoptilus* *Caban.* Western Peru.
- Philydor panerythrus* *Scl.* Colombia.  
     *columbianus* *Cab.* Venezuela and Colombia.  
     *erythropterus* *Scl.* Colombia.  
     *fuscipennis* *Salv.* Veragua.  
     *erythronotus* *Scl. et Salv.* Colombia.  
     *consobrinus* *Scl.* Colombia.  
     *ruficaudatus* (*Lafr. et d'Orb.*) Colombia to Bolivia.  
     *subfulvus* (*Scl.*) Ecuador.  
     *erythrocerus* (*Pelz.*) Guiana and Amazons.  
     *striaticollis* *Scl.* Colombia.  
     *amaurotis* (*Temm.*) Brazil.  
     *subflavescens* *Caban.* Western Peru.
- Heliobletus superciliosus* (*Licht.*) Brazil.
- Anabazenops temporalis* *Scl.* Colombia and Western Ecuador.  
     *subalaris* *Scl.* Veragua to Western Ecuador.  
     *guttulatus* *Scl.* Venezuela.  
     *cabanisi* *Taczan.* Central Peru.
- Xenops heterurus* *Cab. et Hein.* Colombia and Eastern Peru.
- Sittasomus stictolæmus* *Pelz.* Upper Amazons.
- Margarornis stellata* *Scl. et Salv.* Ecuador.
- Dendrocicla ruficeps* *Scl. et Salv.* Panama.  
     *meruloides* (*Lafr.*) Venezuela.  
     *fumigata* (*Licht.*) Brazil.  
     *longicauda* *Pelz.* Amazons.  
     *tyrannina* (*Lafr.*) Colombia.
- Dendrocolaptes punicicollis* *Scl. et Salv.* Guatemala and Costa Rica.  
     *validus* (*Tsch.*) Guiana, Peru, and Colombia.  
     *radiolatus* *Scl. et Salv.* Peru.  
     *concolor* *Pelz.* Amazons.
- Nasica longirostris* (*Licht.*) Guiana.
- Drymornis bridgesi* *Eyton.* Argentine Republic.
- Xiphocolaptes promeropirhynchus* (*Less.*) Colombia to Peru and Bolivia.  
     *procerus* *Cab. et Hein.* Venezuela.
- Dendrexetastes temmincki* (*Lafr.*) Guiana.  
     *perrotti* (*Lafr.*) Guiana.
- Dendroornis guttata* (*Licht.*) Brazil.

*Dendronis rostri-pallens* *Des Murs*. Amazons and Colombia.  
*eytoni* *Sel.* Lower Amazons.  
*elegans* *Pelz.* Amazons and Colombia.  
*spixi* *Less.* Lower Amazons.  
*multiguttata* (*Lafr.*). Guiana and Amazons.

*Picolaptes squamatus* (*Licht.*). Brazil.  
*falcinellus* (*Cab.*). Interior of Brazil.  
*albolineatus* (*Lafr.*). Colombia and Venezuela.  
*puncticeps* *Sel. et Salv.* Guiana.  
*souleyeti* (*Des Murs*). Western Ecuador.  
*fuscicapillus* *Pelz.* Interior of Brazil.  
*layardi* *Sel.* Brazil (Para).

*Xiphorhynchus pusillus* *Sel.* Colombia and Veragua.  
*pucherani* *Lafr.* Colombia.  
*lafresnayanus* (*d'Orb.*). Bolivia.

#### FAMILY FORMICARIIDÆ.

*Thamnophilus undulatus* *Pelz.* Amazons.  
*fuliginosus* *Gould.* Guiana.  
*guttatus* *Vieill.* South Brazil.  
*borbæ* *Pelz.* Madeira River.  
*melanurus* *Gould.* Upper Amazons and Colombia.  
*leuconotus* *Spix.* Upper Amazons.  
*plumbeus* *Sel.* Upper Amazons.  
*cinereo-niger* *Pelz.* Amazons.  
*stellaris* *Spix.* Guiana and Amazons.  
*tristis* *Sel. et Salv.* Guiana.  
*simplex* *Sel.* Brazil (Para).  
*immaculatus* *Lafr.* Amazons; Colombia to Costa Rica.  
*tschudii* *Pelz.* Amazons.  
*æthiops* *Sel.* Upper Amazons.  
*nigriceps* *Sel.* Colombia.  
*nigrocinereus* *Sel.* Lower Amazons.  
*cinereinucha* *Pelz.* Amazons.  
*cinereiceps* *Pelz.* Guiana and Amazons.  
*capitalis* *Sel.* Upper Amazons.  
*murinus* *Pelz.* Guiana and Amazons.  
*cristatus* *Max.* Brazil.  
*capistratus* *Less.* South and East Brazil.  
*albicans* *Lafr.* Colombia.  
*multistriatus* *Lafr.* Colombia.  
*tenuipunctatus* *Lafr.* Colombia and Ecuador.  
*melanochrous* *Sel. et Salv.* High Peru.  
*subfasciatus* *Sel. et Salv.* Bolivia.

*Thamnistes æquatorialis* *Sel.* Ecuador.  
*rufescens* *Caban.* Western Peru.



- Neoctantes niger* (*Pelz.*). Amazons.  
*Clytactantes alixii Elliot.* Eastern Ecuador.  
*Dysithamnus guttulatus (Licht.)*. Brazil and Bolivia.  
     *olivaceus (Tsch.)*. Peru and Bolivia.  
     *xanthopterus Burm.* Brazil.  
     *schistaceus d'Orb.* Bolivia and Eastern Peru.  
     *ardesiaceus ScL. et Salv.* Eastern Ecuador.  
     *unicolor ScL.* Ecuador and Colombia.  
     *plumbeus Max.* Brazil and Lower Amazons.  
     *semiplumbeus ScL. et Salv.* Ecuador.  
*Herpsilochmus pectoralis ScL.* Bahia.  
     *atricapillus Pelz.* Interior of Brazil.  
     *motacilloides Jelski.* Central Peru.  
     *frater ScL. et Salv.* Ecuador.  
*Myrmotherula multo-striata ScL.* Amazons.  
     *guttata (Vieill.)*. Guiana.  
     *hæmatonota ScL.* Upper Amazons.  
     *pyrrhonota ScL. et Salv.* Guiana.  
     *erythrura ScL.* Colombia.  
     *erythronota Hartl.* Brazil.  
     *hauxwelli ScL.* Upper Amazons.  
     *axillaris (Vieill.)*. Guiana and Colombia.  
     *urosticta ScL.* Brazil.  
     *brevicauda (Sw.)*. Brazil.  
     *unicolor Ménétr.* Colombia and Brazil.  
     *cinereiventris ScL.* Guiana, Amazons, and Colombia.  
     *atrogularis Taczan.* Central Peru.  
     *spodionota ScL. et Salv.* Ecuador.  
     *gutturalis ScL. et Salv.* British Guiana.  
*Formicivora strigilata (Spix).* Brazil.  
     *erythrocerca ScL.* Brazil.  
     *malura Temm.* Brazil.  
     *consobrina ScL.* Western Ecuador.  
     *bicolor Pelz.* Upper Amazons.  
     *speciosa Salv.* Western Ecuador (Puna Island).  
*Terenura callinota ScL.* Colombia and Veragua.  
     *caloptera ScL.* Western Ecuador.  
     *humeralis ScL. et Salv.* Eastern Ecuador.  
     *spodioptila ScL. et Salv.* British Guiana.  
*Psilorhamphus guttatus (Max.)*. Interior of Brazil.  
*Microbates torquatus ScL. et Salv.* Guiana.  
*Ramphocænus melanurus Vieill.* Brazil, Guiana, and Venezuela.  
     *cinereiventris ScL.* Interior of Colombia.  
*Cercomacra cærulescens Vieill.* Eastern Brazil.  
     *cinerascens ScL.* Guiana and Amazons.  
     *napensis ScL.* Guiana and Eastern Ecuador.

- Cercomacra approximans* Pelz. Interior of Brazil.  
     *carbonaria* Sel. et Salv. Amazons.  
     *nigricans* Sel. Panama to Western Ecuador.  
     *melanaria* (Ménétr.). South Brazil.
- Pyriglena atra* Sw. Brazil.  
     *picea* Cab. Peru and Ecuador.  
     *serva* Sel. Ecuador and Amazons.
- Gymnocichla chiroleuca* Sel. et Salv. Honduras and Costa Rica.
- Perenostola funebris* (Licht.). Guiana.  
     *minor* Pelz. Interior of Guiana.  
     *fortis* Sel. et Salv. Upper Amazons.
- Heteroenemis nævia* (Gm.). Guiana.  
     *simplex* Sel. Guiana.  
     *argentata* (Des Murs). Upper Amazons.
- Myrmeciza ruficauda* (Max.). Brazil.  
     *squamosa* Pelz. Brazil.  
     *atrothorax* (Bodd.). Guiana, Amazons, interior of Brazil,  
         and Bolivia.  
     *ruficauda* (Pelz.). Interior of Guiana.  
     *hemimelæna* Sel. et Salv. Amazons and Bolivia.  
     *læmosticta* Salv. Costa Rica and Veragua.
- Hypocnemis flavescens* Sel. Interior of Guiana.  
     *hypoxantha* Sel. Amazons.  
     *pæcilonota* Puch. Upper Amazons and Colombia.  
     *lugubris* Pelz. Amazons.  
     *melanura* Sel. et Salv. Upper Amazons.  
     *melanopogon* Sel. Guiana and Amazons.  
     *maculicauda* Pelz. Interior of Brazil.  
     *hemileuca* Sel. et Salv. Upper Amazons.  
     *nævia* (Gm.). Guiana and Upper Amazons.  
     *theresæ* (Des Murs). Upper Amazons.  
     *lepidonota* Sel. et Salv. Eastern Ecuador.  
     *stellata* Sel. et Salv. Eastern Ecuador.  
     *subflava* Cuban. Western Peru.
- Pithys lunulata* Sel. et Salv. Upper Amazons.  
     *melanosticta* Sel. et Salv. Eastern Ecuador.
- Phlogopsis nigromaculata* (Laf. et d'Orb.). Bolivia, Ecuador, and Up-  
     per Amazons.  
     *erythroptera* Gould. Interior of Guiana.  
     *trivittata* Sel. Upper Amazons.
- Formicarius analis* (Laf. et d'Orb.). Bolivia, Ecuador, Panama, Costa  
     Rica.  
     *rufipectus* Salv. Veragua.
- Chamæza nobilis* Gould. Upper Amazons.  
     *mollissima* Sel. Colombia.
- Grallaria varia* (Bodd.). Guiana and Venezuela.

*Grallaria imperator* (Lafr.). Brazil.

*regulus* *Scl.* Western Ecuador.

*princeps* *Scl. et Salv.* Veragua.

*mexicana* *Scl.* Southern Mexico.

*griseonucha* *Scl. et Salv.* Venezuela.

*hypoleuca* *Scl.* Colombia.

*modesta* *Scl.* Colombia.

*brevicauda* (Bodd.). Guiana, Amazons, and Eastern Ecuador.

*macularia* *Temm.* Guiana.

*ochroleuca* (Max.). Brazil.

*fulviventris* *Scl.* Eastern Ecuador.

*haplonota* *Scl.* Venezuela.

*ruficeps* *Scl.* Colombia.

*flavotincta* *Scl.* Colombia.

*erythroleuca* *Scl.* High Peru.

*erythrotis* *Scl. et Salv.* Bolivia.

*andicola* *Cab.* Central Peru.

*rufocinerea* *Scl. et Salv.* Colombia.

*albiloris* *Taczan.* Northern Peru.

*dignissima* *Scl. et Salv.* Eastern Ecuador.

*Grallariocula loricata* *Scl.* Venezuela.

*ferrugineipectus* *Scl.* Venezuela.

*nana* (Lafr.). Colombia.

*eucullata* (*Scl.*). Colombia.

#### FAMILY PTEROPTOCHIDÆ.

*Scytalopus fuscoides* Lafr. Chili.

*senilis* Lafr. Colombia.

*sylvestris* *Jelski.* Central Peru.

*speluncæ* *Ménétr.* Southern Brazil.

*Merulaxis rhinolophus* (Max.). Interior of Brazil.

*Rhinocrypta lanceolata* (Geffr. et d'Orb.). Patagonia and Argentine Republic.

*fusca* *Scl. et Salv.* Argentine Republic.

*Liosceles thoracicus* *Scl.* Interior of Brazil.

#### FAMILY TROCHILIDÆ.

*Eutoxeres heterura* Gould. Ecuador.

*condaminei* (Bourc.) Gould. Ecuador.

*Androdon æquatorialis* Gould. Ecuador.

*Glaucis dornii* (Bourc.) Gould. Brazil.

*antonie* (Bourc. & Muls.) Muls. Guiana.

*leucurus* (Linn.) Bon. Guiana.

*Doleromyia fallax* (Bourc.) Bon. Venezuela.

*Phaëthornis bourcieri* (Less.) Gray. Peru.

*philippii* (Bourc.) Gray. Bolivia.

*guyi* (Less.) Gray. Trinidad, Venezuela, and Eastern Peru.

*idalie* (Bourc. et Muls.) Elliot. South Brazil.

- Phaëthornis pygmaeus* (*Spix*) *Gould*. Guiana and Brazil.  
*episcopus Gould*. Guiana.  
*nigricinctus Lawr*. Upper Amazons, Peru, and Brazil.
- Campylopterus hyperythrus Cab*. Guiana.  
*cuvieri (Delattr. et Bourc.) Bon*. Costa Rica to Colombia;  
 Venezuela.  
*phainopeplus Salv*. Sierra Nevada de Sta Marta, Colombia.
- Aphantochroa gularis Gould*. Ecuador.  
*hypostieta Gould*. Ecuador.
- Oreopyra cinereicauda Lawr*. Costa Rica.  
*Oreotrochilus melanogaster Gould*. Peru.  
*adelæ (D'Orb. et Lafr.) Gould*. Bolivia.
- Lampornis veraguensis Gould*. Veragua.  
*calosoma Elliot*. (Hab. ignot.)?
- Chalybura urochrysea (Gould) Muls*. Panama.  
*Petasophora corruscans Gould*. Colombia?  
*rubrigularis Elliot*. (Hab. ignot).
- Phæolæma æquatorialis Gould*. Ecuador.  
*Iolæma luminosa Elliot*. (Hab. ignot.)?  
*whitelyana Gould*. Peru.
- Sternoclyta cyaneipectus Gould*. Venezuela.  
*Urochroa bougueri (Bourc.) Gould*. Ecuador.
- Lampraster branickii Tuczan*. Peru.  
*Diphlogæna iris Gould*. Bolivia.  
*hesperus Gould*. Ecuador.
- Helianthea isaacsoni (Parz.) Elliot*. (Hab. ignot).  
*eos Gould*. Venezuela.  
*violifera Gould*. Bolivia.  
*osculans Gould*. Peru.  
*dichrourea Tuczan*. Peru.
- Bourcieria inca Gould*. Peru and Bolivia.  
*conradi Gould*. Venezuela.  
*insectivora Gould*. Peru.  
*traviesi (Muls. et Verr.) Elliot*. Colombia.  
*purpurea (Gould) Elliot*. Colombia.  
*assimilis Elliot*. Ecuador?  
*boliviana (Gould) Elliot*. Bolivia.
- Hemistephania euphrosinæ (Muls. et Verr.) Elliot*. Ecuador?  
*Floricola albicrissa (Gould) Elliot*. Ecuador?
- Heliotrypha viola Gould*. Ecuador.  
*micrastur (Gould) Elliot*. Ecuador.  
*barrali Muls. et Verr.* Colombia.
- Heliangelus spencei (Bourc.) Bon*. Venezuela.  
*amethysticollis (D'Orb. et Lafr.) Bon*. Peru and Bolivia.  
*mavors Gould*. Colombia and Venezuela.
- Urosticte ruficrissa Lawr*. Ecuador.

- Eustephanus fernandensis* (King) Reich. Island of Juan Fernandez.  
     *leyboldi* Gould. Island of Mas-a-fuera.  
*Topaza pyra* (Gould) Gray. Rio Negro.  
*Hylonympha macrocera* Gould. Northern Brazil.  
*Thalurania jelskii* Taczan. Peru.  
     *watertoni* (Boure.) Bon. Guiana.  
     *refulgens* Gould. Trinidad.  
     *hypochlora* Gould. Ecuador.  
*Microchera albocoronata* (Lawr.) Gould. Veragua.  
*Selasphorus floresii* Gould. Mexico.  
     *torridus* Salv. Veragua and Chiriqui.  
*Catharna orthura* (Less.) Elliot. Guiana and Venezuela.  
*Rhodopis vesper* (Less.) Gould. Peru.  
     *atacamensis* Leyb. Chili.  
*Calothorax pulchra* Gould. Mexico.  
*Acestrura decorata* Gould. Colombia?  
     *micrura* Gould. Bolivia.  
*Chætocereus jourdani* (Boure.) Gray. Trinidad.  
     *rosæ* (Boure. et Muls.) Cab. & Hein. Venezuela.  
     *bombus* Gould. Ecuador.  
*Thaumastura cora* (Less. et Garn.) Bon. Peru.  
*Myrtis yarrelli* Bourc. Bolivia.  
*Smaragdochrysis iridesceus* Gould. Brazil.  
*Ptochoptera iolæma* (Reich.) Elliot. Brazil.  
*Calliphlox mitchelli* (Boure.) Gould. Ecuador.  
*Lophornis regulus* Gould. Bolivia.  
     *gouldi* (Less.) Gould. Lower Amazons.  
     *adorabilis* Salv. Chiriqui.  
*Popelaria laetitiae* (Boure.) Ridgw. Bolivia?  
*Discura longicauda* (Gmel.) Reich. Guiana and Brazil.  
*Steganura solstitialis* Gould. Ecuador.  
     *peruana* (Gould) Reich. Peru.  
     *addæ* (Boure.) Reich. Bolivia.  
     *cissiura* (Gould) Cab. et Heine. Peru.  
*Loddigesia mirabilis* (Boure.) Gould. Peru.  
*Lesbia nuna* (Less.) Gould. Peru.  
     *eucharis* (Boure.) Reich. Colombia.  
*Zodalia ortonii* (Lawr.) Muls. Ecuador.  
     *glyceria* (Bon.) Elliot. Colombia.  
*Cynanthus mocoa* (Delatt. et Bourc.) Bon. Ecuador, Peru, and Bolivia.  
*Sappho sparganura* (Shaw) Reich. Bolivia and Argentine Republic.  
     *phaon* (Gould) Reich. Bolivia and Peru.  
     *caroli* (Boure.) Elliot. Peru.  
*Oxypogon lindeni* (Parz.) Gould. Venezuela.  
     *cyanolæmus* Salv. et Godm. Colombia (prov. Sta. Marta).  
*Oreonympha nobilis* Gould. Peru.



- Ramphomieron ruficeps* (Gould) Bon. Peru and Bolivia.  
     *dorsale Salv. et Godm.* Colombia (prov. Sta. Marta).  
*Avocettula recurvirostris* (Swains.) Reich. Guiana.  
*Metallura opaca* (Tsch.) Cab. et Heine. Peru and Bolivia.  
     *jelski Cab.* Peru.  
     *chloropogon (Cab. et Heine.) Elliot.* (Hab. ignot.)  
     *eupogon Cab.* Peru.  
     *æneicauda (Gould) Bon.* Peru and Bolivia.  
     *primolina Bourc.* Ecuador.  
     *williami (Bourc. et Delatt.) Bon.* Colombia.  
     *smaragdinicollis (D'Orb. et Lafr.) Bon.* Peru and Bolivia.  
*Augastes lumachellus* (Less.) Bon. Brazil.  
     *superbus (Vicill.) Bon.* Brazil.  
*Phlogophilus hemileucurus* Gould. Ecuador.  
*Schistes personatus* Gould. Ecuador.  
*Adelomyia inornata* Gould. Peru and Bolivia.  
     *chlorospila Gould.* Peru.  
*Anthocephala floriceps* (Gould) Cab. et Heine. Colombia.  
*Aglæactis castelnaudi* (Bourc. et Muls.) Gould. Peru.  
     *pamela (D'Orb. et Lafr.) Gould.* Bolivia.  
*Eriocnemis assimilis* Elliot. Bolivia.  
     *squamata Gould.* Ecuador.  
     *mosquera (Bourc. et Delattr.) Reich.* Colombia.  
     *glaucepoides (D'Orb. et Lafr.) Elliot.* Bolivia.  
     *sapphiropygia Taczan.* Peru.  
     *chrysorama Elliot.* Ecuador.  
     *godini (Bourc.) Reich.* Ecuador.  
     *smaragdinipectus Gould.* Ecuador.  
     *nigrivestis (Bourc. et Muls.) Reich.* Ecuador.  
     *dyselius Elliot.* Ecuador.  
*Uranomitra microrhyncha* Elliot. Honduras?  
     *cyanicollis (Gould) Reich.* Peru.  
*Agrytria viridiceps* Gould. Ecuador.  
     *norrisi (Bourc.) Elliot.* Mexico.  
     *compsa Hein.* Guiana.  
     *neglecta Elliot.* Bolivia.  
     *bartletti Gould.* Eastern Peru.  
     *nitidifrons Gould.* Venezuela?  
     *cæruliceps Gould.* Colombia.  
     *tobaci (Gmel.) Elliot.* Tobago, Trinidad, Venezuela, Guiana,  
         and Brazil.  
     *apicalis (Gould) Hein.* Colombia.  
     *maculicauda (Gould) Heine.* Guiana.  
     *luciae Lawr.* Honduras.  
     *nigricauda Elliot.* Trinidad, Guiana, and Northeastern Bra-  
         zil.

- Agyrtria nitidicauda Elliot.* Guiana.  
     *taczanowskii Sel.* Peru (prov. Cajamarca).  
     *pelzelni Taczan.* Upper Amazons (Guajango).
- Arinia boucardi Muls.* Costa Rica.
- Eupherusa poliocerca Elliot.* Mexico.
- Polytmus leucorrhous Sel. et Salv.* Brazil and Peru.
- Amazilia pristina Gould.* Ecuador and Peru.  
     *leucophæa Reich.* Peru.  
     *alticola Gould.* Ecuador.  
     *ocai Gould.* Mexico.  
     *iodura (Sauc.) Elliot.* Colombia.  
     *lucida Elliot.* Colombia.  
     *felicie (Less.) Elliot.* Venezuela.  
     *warszewiczi (Cab. & Hein.) Elliot.* Colombia.  
     *sancerottii (Bourc. et Delatt.) Elliot.* Colombia.  
     *elegans (Gould) Elliot.* (Hab. ignot.)
- Eucephala smaragdo-cærulea Gould.* Brazil.  
     *cæruleo-lavata Gould.* Brazil.  
     *scapulata Gould.* Guiana?  
     *hypocyanea Gould.* Brazil?  
     *subcærulea Elliot.* Brazil?  
     *chlorocephala (Bourc.) Gould.* Ecuador.  
     *cyanogenys (Prinz.) Gould.* Brazil.
- Timolia lerchi (Muls. et Verr.) Muls.* Colombia.
- Iache magica (Muls. et Verr.) Elliot.* Mexico.
- Hylocharis lactea (Less.) Gray.* Brazil.  
     *viridiventris Berlepsch.* Trinidad and Venezuela.
- Chlorostilbon auriceps Gould.* Northwestern Mexico.
- Panychlora alicie (Bourc. et Muls.) Cab. et Hein.* Venezuela.  
     *stenura Cab. et Heine.* Venezuela.

## Family CYPSELIDÆ.

- Cypselus squamatus Cass.* Guiana and Amazons.  
     *andicola Lafr. et d'Orb.* Bolivia and Peru.
- Panyptila cayanensis (Gm.).* Guiana.
- Hemiprocne biscutata (Sel.).* Southern and Eastern Brazil.
- Chætura cinereicauda Cass.* Brazil.  
     *cinereiventris Sel.* Brazil.  
     *slateri Pelzelni.* Upper Amazons.  
     *spinicauda (Temm.).* Guiana.  
     *fumosa Salv.* Veragua and Colombia.
- Cypseloides senex (Temm.).* Brazil.  
     *fumigatus (Streubel).* Brazil and Peru.

## Family CAPRIMULGIDÆ.

- Nyctibius longicaudatus (Spix).* Upper Amazons.  
     *leucopterus (Max.).* Brazil.

- Nyctibius bracteatus Gould.* Guiana.  
*Lurocalis semitorquatus (Gm.).* Guiana and Amazons.  
     *nattereri (Temm.).* Brazil.  
*Chordeiles pusillus Gould.* Brazil.  
*Nyctiprogne leucopygia (Spix).* Amazons and Brazil.  
*Antrostomus sericeo-caudatus Cass.* South America.  
     *nigrescens Cab.* Guiana, Amazons, and Colombia.  
     *maulicaudus (Lawr.).* Bolivia and Peru.  
*Stenopsiscayennensis (Gm.).* Guiana, Tobago, Martinique, and Colombia.  
     *ruficervix Sel.* Colombia and Ecuador.  
     *æquicaudata (Peale).* Western Peru.  
*Hydropsalis trifurcata Natt.* Upper Amazons.  
     *furcifera (Vieill.).* Interior of Brazil, Paraguay, Bolivia,  
         and Argentine Republic.  
     *lyra Bp.* Colombia and Venezuela.  
     *segmentata Cassin.* Colombia and Ecuador.  
*Heleothreptus anomalus (Gould).* Interior of Brazil.  
*Steatornis caripensis Humb.* Colombia, Venezuela, and Trinidad.

Family PICIDÆ.

- Picumnus rufiventris Bp.* Upper Amazons.  
     *cinnamomeus Wagl.* Coasts of Venezuela and Colombia.  
     *castelnaudi Malh.* Eastern Peru.  
     *leucogaster Pelz.* Interior of Guiana.  
     *minutus (Linn.).* Brazil.  
     *aurifrons Pelz.* Upper Amazons.  
     *cirrhatu8 Temm.* Brazil.  
     *lepidotus Cab. et Hein.* Guiana.  
     *squamatul8 Lafr.* Colombia and Venezuela.  
     *albo-squamatus Lafr. et d'Orb.* Bolivia.  
     *slateri Taczan.* Western and Northern Peru.  
     *micromegas Sund.* Brazil?  
     *lawrencei Cory.* Haiti.  
*Campephilus imperialis Gould.* Western Mexico.  
     *slateri Malh.* Western Ecuador.  
     *trachelopyrus (Malh.).* Amazons.  
*Hylotomus galeatus (Temm.).* South Brazil.  
*Chloronerpes sanguinolentus Sel.* Honduras.  
     *sedulus (Cab. et Heine.).* Guiana.  
     *ruficeps (Spix).* Lower Amazons and interior of Brazil.  
     *hilaris (Cab. et Heine.).* Upper Amazons.  
     *tænionotus (Reich.).* Brazil.  
     *malherbei Sel.* Bolivia and Ecuador.  
     *simplex Salvin.* Chiriqui.  
     *capistratus (Malh.).* Interior of Guiana and Upper Ama-  
         zons.

- Chloronerpes leucolæmus* (*Malh.*). Interior of Brazil.  
*dignus* *Scl. et Salv.* Colombia.  
*callopterus* *Lawr.* Panama.  
*xanthochlorus* *Scl. et Salv.* Venezuela.
- Chrysoptilus speciosus* *Scl.* Upper Amazons.  
*icteromelas* (*Vieill.*). Interior of Brazil.  
*cristatus* (*Vieill.*). Argentine Republic.  
*atricollis* (*Malh.*). Western Peru.
- Melanerpes pulcher* *Scl.* Colombia.
- Centurus hypopolius* (*Wagl.*). Mexico.  
*terricolor* *Berlepsch.* "Orinoco district, or Trinidad."  
*rubriventris* *Sicains.* Yucatan?
- Hypoxanthus atriceps* *Scl. et Salv.* High regions of Peru and Bolivia.  
*brevirostris* *Taczan.* Central Peru.
- Colaptes stolzmanni* *Taczan.* North Peru.  
*leucofrenatus* v. *Martens.* Argentine Republic (Mendoza).
- Celeus torquatus* (*Bodd.*). Guiana.  
*elegans* (*Müll.*). Guiana.  
*reichenbachii* (*Malh.*). Venezuela and Trinidad.  
*flavus* (*Müll.*). Guiana, Venezuela, and Amazons.  
*citreopygius* *Scl. et Salv.* Upper Amazons.  
*grammicus* (*Malh.*). Guiana and Upper Amazons.  
*multi-fasciatus* (*Malh.*). Amazons.  
*subflavus* *Scl. et Salv.* Brazil (Bahia).  
*immaculatus* *Berlepsch.* Panama (?).  
*spectabilis* *Scl. et Salv.* Eastern Ecuador.

## Family MOMOTIDÆ.

- Momotus nattereri* *Scl.* Interior of Brazil and Bolivia.  
*castaneiceps* *Gould.* Guatemala.
- Baryphthengus ruficapillus* (*Vieill.*). Brazil and Paraguay.

## Family TODIDÆ.

- Todus pulcherrimus* *Sharpe.* Jamaica (?).

## Family ALCEDINIDÆ.

- Ceryle stellata* (*Meyen.*). Chili and Patagonia.

## Family TROGONIDÆ.

- Trogon chionurus* *Scl. et Salv.* Panama.  
*aurantius* *Spix.* Brazil.
- Euptlotis neoxenus* (*Gould.*). Mexico.
- Pharomacrus fulgidus* (*Gould.*). Colombia and Venezuela.  
*pavoninus* (*Spix.*). Upper Amazons.  
*heliactin* *Cab. et Heine.* Eastern Ecuador.  
*xanthogaster* *Turati et Salvad.* Colombia.

Family GALBULIDÆ.

- Galbula cyaneicollis* *Cassin*. Lower Amazons.  
*lencogastra* *Vieill*. Guiana.  
*chalcothorax* *Scl*. Eastern Ecuador.  
*tombacea cyanescens* (*Der.*). Amazons.  
*tombacea fuscicapilla* (*Scl.*). Colombia.  
*albirostris chaleocephala* (*Dev.*). Eastern Peru.  
*Urogalba amazonum* *Scl*. Lower Amazons.  
*Brachygalba gœringi* *Scl. et Salv.* Venezuela.  
*albigularis* (*Spix*). Upper Amazons.  
*melanosterna* (*Scl.*). Interior of Brazil and Bolivia.  
*salmoni* *Scl. et Salv.* Colombia.  
*Jacamaralecyon tridactyla* (*Pall.*). Brazil.  
*Jacamerops isidorei* *Der.* Upper Amazons.  
*Galbaleyrhynchus lencotis* *Des Murs*. Upper Amazons.

Family BUCCONIDÆ.

- Bucco pectoralis* *Gray*. Panama.  
*ordi* *Cass.* Interior of Guiana and Venezuela.  
*tectus* (*Bodd.*). Guiana.  
*picatus* *Scl*. Upper Amazons.  
*pulmentum* *Bp.* Upper Amazons.  
*striolatus* *Pelz.* Interior of Brazil.  
*lanceolatus* *Derville.* Peru and Eastern Ecuador.  
*macrorhynchus napensis* (*Scl.*) Eastern Ecuador.  
*Malacoptila fusca* (*Gm.*). Guiana, Upper Amazons, and Colombia.  
*rufa* (*Spix*). Upper Amazons.  
*castanea Verreaux.* Ecuador.  
*fulvogularis* *Scl.* Bolivia and Peru.  
*substriata* *Scl.* Colombia.  
*aspera* *Scl.* Venezuela.  
*Nonnula rubecula* (*Spix*). Lower Amazons.  
*ruficapilla* (*Tsch.*). Upper Amazons.  
*Monasa morpheus* (*Hahn.*). Brazil.  
*Chelidoptera brasiliensis* *Scl.* Brazil.

Family CUCULIDÆ.

- Neomorphus geoffroyi* (*Temm.*). Brazil.  
*salvini* *Scl.* Nicaragua to Colombia.  
*pucherani* *Derille.* Upper Amazons.  
*rufipennis* *Gray.* Guiana.  
*radiolosus* *Scl. et Salv.* Ecuador.  
*Dromococcyx phasianellus mexicanus* (*Bp.*). Mexico and Guatemala.  
*Diplopterus navius* (?) *chochi* (*Vieill.*). South Brazil and Paraguay.  
 (?) *lessoni* (*Bp.*). (Hab. ignot.)



- Hyetornis pluvialis rufigularis* "*Herz. v Wurtemb.*" St. Domingo.  
*Piaya cayana nigricrissa* (*Scl.*). Ecuador, Chiriqui.  
*Coccygus ferrugineus* *Gould.* Cocos Island.  
     *lindeni* *Allen.* Lower Amazons.  
     *euleri* *Caban.* Southeastern Brazil.

## Family RHAMPHASTIDÆ.

- Rhamphastos inca* *Gould.* Bolivia and Peru.  
     *citreolæmus* *Gould.* Colombia.  
     *osculans* *Gould.* Interior of Guiana and Lower Amazons.  
     *culminatus* *Gould.* Upper Amazons.  
*Pteroglossus wiedi* *Sturm.* Brazil.  
     *erythropygius* *Gould.* Nicaragua.  
     *inscriptus* *Wagler.* Lower Amazons and interior of Brazil.  
     *beauharnaisi* *Wagl.* Upper Amazons.  
     *sturmi* *Natt.* Banks of Madeira River.  
     *azaræ* (*Vieill.*). Interior of Guiana.  
*Selenidera gouldi* (*Natt.*). Lower Amazons.  
     *nattereri* (*Gould.*). Interior of Guiana.  
     *reinwardti* (*Wagl.*). Eastern Ecuador.  
*Andigena laminirostris* *Gould.* Western Ecuador.  
     *hypoglæus* (*Gould.*). Ecuador and Peru.  
     *eucullatus* (*Gould.*). Bolivia.  
*Aulacorhamphus sulcatus* *Sw.* Venezuela.  
     *derbianus* (*Gould.*). Ecuador and Bolivia.  
     *atrogularis* (*Sturm.*). Peru.  
     *cyanolæmus* *Gould.* Ecuador.

## Family CAPITONIDÆ.

- Capito quinticolor* *Elliot.* Colombia.  
     *versicolor* (*Müll.*). Upper Amazons.  
     *aurantiicollis* *Scl.* Upper Amazons.  
     *squamatus* *Salv.* Western Ecuador.

## Family PSITTACIDÆ.

- Ara hyacinthina* (*Lath.*). Interior of Brazil.  
     *spixi* (*Wagl.*). Brazil.  
     *rubrigenis* *Lafr.* Bolivia.  
     *tricolor* (*Bechst.*). Cuba.  
     *caninde* (*Wagl.*). Paraguay.  
     *hahni* (*Souancé*). Guiana, Venezuela, and Amazons.  
     *leari* (*Bp.*). Brazil?  
     *conloni* *Scl.* High Eastern Peru.  
*Rhynchopsitta pachyrhyncha* (*Sw.*). Mexico.

- Conurus icterotis* (*Mass. et Souancé*). Colombia.  
*hæmorrhous* (*Spix*). Brazil.  
*luteus* (*Bodd.*). Lower Amazons.  
*wagleri Gray*. Venezuela and Colombia.  
*solstitialis* (*Linn.*). Guiana and Amazons.  
*jendaya* (*Gm.*). Brazil.  
*æruginosus* (*Linn.*). Venezuela and interior of Guiana.  
*caetorum* (*Max.*). Brazil.  
*devillei Mass. et Souancé*. Bolivia.  
*roseifrons G. R. Gray*. Upper Amazons.  
*rhodocephalus Sel. et Salr.* High Venezuela.  
*luciani Deville*. Upper Amazons.  
*perlatus* (*Spix*). Lower Amazons.  
*molinæ Mass. et Souancé*. Interior of Brazil.  
*rhodogaster Sel.* Banks of the Madeira.  
*hæmatotis* (*Souancé*). Venezuela.  
*melanurus Spix*. Interior of Guiana.  
*souancæi Verr.* Upper Amazons.  
*hilaris Burn.* Paraguay.  
*egregius Sel.* Guiana (Demerara?).  
*glaucifrons v. Martens.* Argentine Republic (prov. S. Luis).  
*Bolborhynchus monachus* (*Bodd.*). Interior of Brazil, Paraguay, and Argentine Republic.  
*luhsi Pelz.* Bolivia.  
*aymara d'Orb.* Bolivia and Western Argentine Republic.  
*rubrirostris Burn.* Western Argentine Republic.  
*orbignianus* (*Bp.*). Bolivia and Peru.  
*andicola* (*Finsch*). Peru.  
*Brotagerys virescens* (*Gm.*). Lower Amazons.  
*subærulea* (*Lawr.*). Panama.  
*ferrugineifrons Lawr.* Colombia.  
*jugularis Deville*. Interior of Guiana and Upper Amazons.  
*tuipara* (*Gm.*). Guiana, Venezuela, and Lower Amazons.  
*chrysosema Sel.* Banks of the River Madeira.  
*tui* (*Gm.*). Brazil.  
*Chrysotis festiva* (*Linn.*). Guiana, Venezuela, and Amazons.  
*bodini Finsch.* (Hab. ignot.)  
*cyanopsis* (*Vieill.*). Antilles.  
*pretrei* (*Temm.*). South Brazil.  
*viridigenalis Cassin.* Colombia and Ecuador.  
*dufresniana* (*Kuhl.*). Brazil.  
*nattereri Finsch.* Interior of Brazil.  
*ochroptera* (*Gm.*). Venezuela.  
*xanthops* (*Spix*). Interior of Brazil.  
*erythrura* (*Kuhl.*). Brazil.  
*lactifrons Lawr.* (Hab. ignot.)

- Chrysotis cæligena* *Lawr.* Guiana.  
     *canipalliata* *Caban.* Colombia.  
     *panamensis* *Caban.* Panama.
- Pionus corallinus* *Bp.* Ecuador.  
     *sordidus* (*Linn.*). Venezuela.  
     *violaceus* (*Bodd.*). Guiana and Lower Amazons.
- Pionopsitta melanotis* (*Lafr.*). Bolivia.  
     *pyrrhops* *Salv.* Western Ecuador.
- Caica pyrilia* (*Bp.*). Colombia.  
     *vulturina* (*Kuhl.*). Lower Amazons.  
     *leucogastra* (*Kuhl.*). Lower Amazons.
- Urochroma stictoptera* *Scl.* Colombia.  
     *surda* (*Kuhl.*). Brazil.  
     *melanonota* (*Kuhl.*). Brazil.  
     *purpurata* (*Gm.*). Guiana and Lower Amazons.  
     *dilectissima* *Scl. et Salv.* Venezuela.
- Psittacula selateri* *Gray.* Upper Amazons.

## Family STRIGIDÆ.

- Aluco punctatissima* *Gould.* Galapagos Islands.  
     *flammea* *glancops* (*Kaup.*). St. Domingo.
- Ciccaba huhuia* (*Daud.*). Guiana, Amazons, and Brazil.  
     *melanonota* (*Tsch.*). Brazil and Pern.  
     *sninda* (*Vieill.*). Brazil and Paraguay.  
     *cayennensis* (*Gm.*). Guiana.  
     *polygrammica* *Gray.* Brazil.  
     *albigularis* *Cassin.* Colombia and Ecuador.  
     *nigro-lineata spilonota* (*Gray.*). Colombia.
- Strix rufipes* (*King.*). Patagonia.  
     *hylophilum* (*Temm.*). Brazil, Guiana, and Venezuela.
- Nyctalitinus harrisi* (*Cassin.*). Colombia.
- Lophostrix cristata* (*Daud.*). Guiana and Lower Amazons.
- Scops nudipes* (*Vieill.*). Costa Rica to Colombia.  
     *brasiliannus atricapillus* (*Temm.*) Northern Brazil.  
     *brasiliannus ustus* *Scl.* Upper Amazons.
- Speotyto cunicularia guadeloupensis* *Ridg.* Island of Guadeloupe.
- Glaucidium phalænoides* (*Daud.*). Trinidad.  
     *tephronotum* *Sharpe.* South America.  
     *cobanense* *Sharpe.* Central Guatemala.

## Family FALCONIDÆ.

- Rupornis magnirostris saturatus* (*Scl. et Salv.*). Bolivia.
- Buteo galapagensis* (*Gould.*). Galapagos Islands.  
     *unicolor* *D'Orb. et Lafr.* Bolivia.  
     *hypospodius* *Gurney.* Brazil, Amazons, Venezuela, and Colombia.  
     *pœcilocheus* *Gurney.* Ecuador.

- Urubitinga gundlachi* (*Caban.*). Cuba.  
*Leucopternis palliata* (*Pelz.*). Brazil.  
     *scotoptera* (*Max.*). Brazil.  
     *albicollis* (*Lath.*). Guiana, Amazons, Venezuela, and Trinidad.  
     *melanops* (*Lath.*). Guiana and Amazons.  
     *superciliaris* (*Pelz.*). Lower Amazons.  
     *princeps* *Sel.* Costa Rica.  
     *plumbea* *Salv.* Ecuador.  
     *occidentalis* *Salv.* Western Ecuador.  
*Plangus neogæus* *Sunder.* Brazil.  
*Harpyhaliaëtus coronatus* (*Vieill.*). South Brazil to Patagonia.  
*Morphnus tæniatus* *Gurney.* Eastern Ecuador.  
*Spizaëtus isidorei* (*Des Murs*). Colombia.  
*Accipiter guttatus* (*Vieill.*). Bolivia and Paraguay.  
     *pectoralis* *Bp.* Brazil and Amazons.  
     *fringilloides* (*Vig.*). Cuba.  
     *chionogaster* *Kaup.* Guatemala and Venezuela.  
     *collaris* *Sel.* Colombia.  
     *nigro-plumbeus* *Laur.* Western Ecuador.  
     *salvini* *Ridgw.* Venezuela.  
     *poliogaster* (*Temm.*). Brazil.  
*Micrastur zonothorax* (*Cab.*). Venezuela and Colombia.  
     *concentricus* (*Less.*). Guiana, Amazons, and Bolivia.  
     *amaurus* *Gurney.* Panama.  
     *pelzelni* *Ridgw.* Eastern Peru.  
*Geranospizias hemidaetylus* (*Temm.*). Guiana and Amazons.  
*Tinnunculus* [?] *ferrugineus* (*De Sauss.*) *Ridgw.* Haiti.  
 (?) *Rostrhamus leucopygus* (*Spix*). Brazil.  
     *tæniurus* *Cab.* Amazons.  
*Regerhinus megarhynchus* (*Des Murs*). Upper Amazons.  
*Spiziapteryx circumcinctus* (*Kaup.*). Argentine Republic.  
 (?) *Ibycter formosus* (*Lath.*). Brazil.  
     *ater* (*Vieill.*). Colombia, Guiana, and Amazons.  
*Milvago carunculatus* (*Des Murs*). Colombia and Ecuador.  
     *albigularis* (*Gould*). Patagonia.

Family CATHARTIDÆ.

- Cathartes pernigra* *Sharpe.* Brazil.  
*Sarcorhamphus æquatorialis* *Sharpe.* Ecuador, Peru, and Chili.

Family PELECANIDÆ.

- Pelecanus molinæ* *Gray.* Coasts of Chili and Peru.

Family PHALACROCORACIDÆ.

- Phalacrocorax bougainvillei* (*Less.*). Peru and Chili.

## Family ARDEIDÆ.

*Butorides plumbeus* (*Sund.*). Galapagos Islands.

*Tigrisoma fasciatum* (*Such.*). Brazil.

*Nyctherodius pauper* *Scl. et Salv.* Galapagos Islands.

## Family PLATALEIDÆ.

*Cercibis oxycerca* (*Spix*). Colombia, Amazons, Guiana, and Brazil.

## Family PHENICOPTERIDÆ.

*Phenicopterus glyphorhynchus* *Gray.* Galapagos Islands.

*andinus Philippi.* Chilian Andes.

## Family PALAMEDEIDÆ.

*Palamedea cornuta* *Linn.* Guiana and Amazons.

*Chauna derbiana* *Gray.* Coast-region of Colombia.

## Family ANATIDÆ.

"*Bernicla*" *dispar* *Ph. et Landb.* Chili, Argentine Republic, and Patagonia.

*poliocephala* (*Gray*). Chili, Patagonia, and Falkland Islands.

*rubidiceps* (*Scl.*). Falkland Islands.

*inornata* (*King*). Patagonia.

*Sarcidiornis melanouota* (*Gm.*). Paraguay to Guiana.

"*Anas*" *chaleoptera* *Kittl.* Chili and Patagonia.

*Querquedula torquata* (*Vieill.*). Argentine Republic.

*oxyptera* (*Meyen*). Peru.

*andium* *Scl. et Salv.* Ecuador.

*versicolor* (*Vieill.*) Argentine Republic, Chili, Patagonia, and Falkland Islands.

*puna* (*Tsch.*). Peru and Bolivia.

"*Fuligula*" *nationi* *Scl.* Western Peru.

*Merganetta turneri* *Scl. et Salv.* High Peru.

*leucogenys* *Tsch.* Colombia to Peru.

"*Mergus*" *brasiliensis* (*Vieill.*). South Brazil.

## Family COLUMBIDÆ.

*Columba gymnophthalma* *Temm.* Interior of Brazil.

*plumbea* *Vieill.* Brazil, Peru, and Colombia.

*albipennis* *Scl. et Salv.* Peru, and high Bolivia.

*Zenaida ruficauda* *Bp.* Venezuela and Colombia.

*Metriopelia aymara* (*Knip et Préröst*). Bolivia and Peru.

*Melopelia plumbeescens* *Laur.* Guiana.

*Columbula campestris* (*Spix*). Interior of Brazil.



- Chamæpelia cruziana* (*Knip et Prév.*). Peru and Western Ecuador.  
*buckleyi* *Scl. et Salv.* Ecuador.  
*Gymnopelia erythrothorax* (*Meyen*). Bolivia and Western Peru.  
*Peristera geoffroyi* (*Temm.*) Brazil.  
*cyanopis* *Pelzeln.* Interior of Brazil.  
*Leptoptila ochroptera* *Pelz.* Brazil.  
*megalura* *Scl. et Salv.* Bolivia.  
*Geotrygon caniceps* *Cab.* Cuba.  
*frenata* (*Tsch.*). Peru.  
*Osculatia sapphirina* *Bp.* Western Ecuador.  
*purpurata* *Salv.* Ecuador.

Family CRACIDÆ.

- Crax globulosa* *Spix.* Upper Amazons.  
*daubentoni* *Gray.* Venezuela.  
*carunculata* *Temm.* South Brazil.  
*alberti* *Fraser.* Colombia.  
*mikani* *Pelz.* (Hab. ignot.)  
*pinima* *Pelz.* Brazil (Para).  
*erythrognatha* *Scl. et Salv.* Interior of Colombia.  
*Nothocrax urumutum* *Spix.* Guiana and Upper Amazons.  
*Pauxi galeata* (*Lath.*). Guiana and Venezuela.  
*Mitua tuberosa* (*Spix.*). Guiana, Upper Amazons, and Peru.  
*tomentosa* (*Spix.*). Guiana.  
*salvini* *Reinh.* Brazil.  
*Stegnoterna montagnii* (*Bp.*). Colombia and Ecuador.  
*Penelope greayi* *Gray.* Colombia.  
*jaeneaca* *Spix.* Eastern Brazil.  
*jacupeba* *Spix.* South Brazil.  
*cristata* (*Linn.*). Costa Rica to Colombia, Guiana.  
*boliviana* *Reich.* Upper Amazons.  
*rufiventris* *Tsch.* Bolivia and Peru.  
*pileata* *Wagl.* Amazons.  
*ochrogaster* *Pelz.* Interior of Brazil.  
*rufiventris* *Tschudi.* Peru and Bolivia.  
*selateri* *Gray.* Bolivia.  
*Pipile cunjubi* (*Pelz.*). Lower Amazons.  
*Aburria carunculata* *Reich.* Colombia.  
*Chamæpetes goudoti* (*Lesson*). Colombia to Peru.  
*Ortalia motmot* (*Linn.*). Guiana.  
*araucan* (*Spix.*). Lower Amazons.  
*ruficeps* *Wagl.* Brazil.  
*ruficauda* *Jard.* Tobago and Venezuela.  
*canicollis* *Wagl.* Paraguay.  
*albiventris* *Wagl.* Eastern Brazil.  
*caracco* *Wagl.* Colombia and Upper Amazons.

- Ortalia superciliaris* Gray. (Hab. igot.)  
*ruficrissa* *Scl. et Salv.* Colombia.  
*leucogastra* Gould. Western Guatemala and Nicaragua.  
*garrula* (*Humb.*) Colombia.  
*erythroptera* *Scl. et Salv.* Western Ecuador.

## Family PERDICIDÆ.

- Cyrtonyx sallæi* Verreaux. Mexico.  
*Eupsychortyx sonninii* (*Temm.*) Guiana and Venezuela.  
*parvieristatus* Gould. Colombia.  
*leucotis* Gould. Colombia.  
*hypoleucus* Gould. Guatemala.  
*Dendrortyx macrurus* (*Jard. et Selby*). Mexico.  
*barbatus* Gould. Mexico.  
*Odontophorus pachyrhynchus* Gould. Peru and Colombia.  
*speciosus* Tsch. Peru.  
*dentatus* *Temm.* Brazil.  
*columbianus* Gould. Venezuela.  
*stellatus* Gould. Upper Amazons.  
*balliviani* Gould. Bolivia and Peru.  
*strophium* Gould. South America.  
*thoracicus* Gambel. Mexico and Guatemala.  
*erythropterus* Gould. Ecuador.  
*melanonotus* Gould. Ecuador.  
*hyperythrus* Gould. Colombia.  
*hypospodius* *Scl. et Salv.* Colombia.  
*spodiostethus* *Salv.* Veragua.  
*cinctus* *Salv.* Veragua.

## Family RALLIDÆ.

- Rallus maculatus* Bodd. Panama, Colombia, Trinidad, Guiana, Paraguay, and South Brazil.  
*antareticus* King. Chili.  
*semiplumbens* *Scl.* Colombia.  
*nigricans* Vieill. South Brazil and Paraguay.  
*Aramides albiventris* Lawr. Mexico, Guatemala, and Honduras.  
*ruficollis* (*Gm.*) Guiana.  
*saracura* (*Spix*). Paraguay and South Brazil.  
*mangle* (*Spix*). South and East Brazil.  
*calopterus* *Scl. et Salv.* Eastern Ecuador.  
*Porzana albicollis* (*Vieill.*) Paraguay, South Brazil, Guiana, and Venezuela.  
*cayennensis* (*Gm.*) Guiana, Amazons, and Brazil.  
*levraudi* *Scl. et Salv.* Venezuela.  
*concolor* (*Gosse*). Jamaica, Guatemala, and Brazil.

*Porzana castaneiceps* *Scl. et Salv.* Eastern Peru.

*hauxwelli* *Scl. et Salv.* Upper Amazons.

*melanophæa* (*Vieill.*). South Brazil, Paraguay, Bolivia, and Venezuela.

*albigularis* (*Lawr.*). Panama, Costa Rica, and Mosquita.

*leucopyrrha* (*Vieill.*). Paraguay, Argentine Republic, and South Brazil.

*flaviventris* (*Bodd.*). Guiana, Jamaica, Cuba, Venezuela, Brazil, and Paraguay.

*splionota* (*Gould*). Galapagos Islands.

*notata* (*Gould*). Argentine Republic and Patagonia.

*cinerea* (*Vieill.*). Guiana, Amazons, Peru, and Trinidad.

*erythrops* *Scl.* Western Peru.

*cœnops* *Scl. et Salv.* Eastern Ecuador.

*Thyrorhina schomburgki* (*Cab.*). Guiana and Venezuela.

*Ionornis parvus* (*Bodd.*). Guiana, Amazons, and interior of Brazil.

*Fulica cornuta* *Bp.* Bolivia.

*ardesiaca* *Tsch.* Bolivia to Ecuador.

*armillata* *Vieill.* South Brazil, Paraguay, Patagonia, and Chili.

*leucopygia* (*Hartl.*). Uruguay, Patagonia, Falkland Islands, and Chili.

*leucoptera* *Vieill.* Argentine Republic, Uruguay, and Bolivia.

#### Family PSOPHIIDÆ.

*Psophia crepitans* *Linn.* Guiana.

*napensis* *Scl. et Salv.* Eastern Ecuador.

*ochroptera* *Pelz.* Interior of Guiana.

*leucoptera* *Spix.* Upper Amazons.

*viridis* *Spix.* Banks of the Madeira River.

*obscura* *Pelz.* Lower Amazons.

#### Family CEDIENEMIDÆ.

*Cedienemis superciliaris* *Tsch.* Western Peru.

#### Family CHARADRIIDÆ.

*Pluvianellus socialis* *Hombr. et Jacq.* Straits of Magellan.

#### Family HÆMATOPODIDÆ.

*Hæmatopus leucopus* (*Garnot*). Falkland Islands.

#### Family THINOCORIDÆ.

*Attagis latreillei* *Lesson.* Bolivia.

*chimborazensis* *Scl.* Andes of Ecuador.

*malouina* (*Bodd.*). Falkland Islands and Straits of Magellan.

*Thinocorus orbignyianus* *Geoffr. et Less.* Chili and Peru.

## Family RECURVIROSTRIDÆ.

*Recurvirostra andina* *Ph. et Landb.* High Peru.

## Family SCOLOPACIDÆ.

*Gallinago frenata* (*Max.*). Guiana, Brazil, and Antaretic America.

*undulata* (*Bodd.*). Guiana.

*gigantea* (*Temm.*). South Brazil.

*stricklandi* *Gray.* Chili and Patagonia.

*jamesoni* (*Bp.*). High Ecuador.

*imperialis* *Sel. et Salv.* High Colombia.

*Phegornis mitchelli* (*Fraser*). Chili.

## Family LARIDÆ.

*Sterna exilis* *Tsch.* Peru and Chili.

*eurygnatha* *Saunders.* Brazil and Trinidad.

*Larus fuliginosus* *Gould.* Galapagos Islands.

*serranus* *Tsch.* Peru, Bolivia, and Argentine Republic.

*Megalestris chilensis* (*Bp.*). Chili and Straits of Magellan.

## Family PROCELLARIIDÆ.

*Diomedea melanophrys* (*Temm.*). Falkland Islands and coasts of Antaretic America.

*Procellaria tethys* *Bonap.* Galapagos Islands.

*Pelagodroma marina* (*Lath.*). Coasts of Southern South America.

*Puffinus elegans* *Gigl. et Salvad.* South Atlantic Ocean.

*tenebrosus* *Natt.* Coasts of Antaretic America.

*Prionus antarcticus* (*Gm.*). Straits of Magellan.

*Cestrelata fuliginosa* (*Kuhl.*). Coasts of Brazil.

*phæopygia* *Salv.* Galapagos Islands.

*defilippiana* *Gigl. et Salvad.* Southeastern Pacific.

*arminjoniana* *Gigl. et Salvad.* Trinidad and Southern Atlantic.

*magentæ* *Gigl. et Salvad.* South Pacific Ocean.

*externa* *Salv.* Island of Mas-a-fuera.

*Prion vittatus* (*Gm.*). Coasts of Brazil.

*Halodroma berardi* (*Q. et G.*). Falkland Islands.

*Pseudoprion turtur* (*Smith*). Falkland Islands.

## Family PODICEPIDIDÆ.

*Centropelma micropterum* *Gould.* High Bolivia.

## Family SPHENISCIDÆ.

*Eudyptula serresiana* *Oust.* Faierland Islands.

*Spheniscus mendiculus* *Sund.* Galapagos Islands.

*Dasyrhamphus herculis* *Finsch.* (Hab. ignot.)

Family TINAMIDÆ.

- Tinamus solitarius* (Vicill.). Paraguay and Brazil.  
     *tao* (Temm.). Amazons, Guiana, Venezuela, and Colombia.  
     *ruficeps* Sel. et Salv. Western Ecuador to Veragua.  
     *major* (Gm.). Brazil.  
     *suberistatus* Cab. Guiana.  
     *guttatus* Pelzeln. Upper Amazons.
- Nothocercus julius* Bp. Colombia and Ecuador.  
     *nigricapillus* Gray. (Hab. ignot.)
- Crypturus cinereus* (Gm.). Guiana and Amazons.  
     *obsoletus* (Temm.). Brazil and Paraguay.  
     *castaneus* (Sel.). Colombia.  
     *tataupa* (Temm.). South Brazil and Paraguay.  
     *cerviniventris* Sel. et Salv. Venezuela.  
     *parvirostris* Wagl. Brazil.  
     *strigulosus* (Temm.). Brazil.  
     *erythropus* (Pelz.). Interior of Guiana.  
     *noctivagus* (Max.). Brazil.  
     *variegatus* (Gm.). Guiana and Lower Amazons.  
     *bartletti* Sel. et Salv. Upper Amazons.  
     *radiatus* Gray. Bolivia.  
     *undulatus* (Temm.). Brazil and Amazons.  
     *transfasciatus* Sel. et Salv. Ecuador.
- Rhynchotus maculicollis* Gray. Bolivia.
- Nothoprocta perdicaria* (Kittl.). Chili.  
     *ornata* (Gray). Bolivia.  
     *pentlandi* (Gray). Bolivia.  
     *curvirostris* Sel. et Salv. Ecuador.  
     *taczanowskii* Sel. et Salv. High Peru.  
     *branickii* Taczan. Central Peru.  
     *døringi* Caban. Argentine Republic.  
     *punctulata* Gay. Chili.
- Nothura marmorata* Gray. Bolivia.  
     *boraquira* (Spix). Brazil, Paraguay, and Argentine Republic.  
     *media* (Spix). Brazil.
- Taoniscus nanus* (Temm.). Brazil and Paraguay.
- Calodromas elegans* (D'Orb et Is. Geoffr.). Argentine Republic.
- Tinamotis pentlandi* Vigors. Bolivian and Peruvian Andes.

Family RHEIDÆ.

- Rhea macrorhyncha* Sel. (Hab. ignot.)
- Pteroenemis darwini* (Gould). Patagonia.



**DESCRIPTION OF A NEW SUB-SPECIES OF LOXIGILLA FROM THE  
ISLAND OF ST. CHRISTOPHER, WEST INDIES.**

**By GEORGE N. LAWRENCE.**

*Loxigilla portoricensis* var. *grandis*.

*Male*.—The general plumage is of a deep lustrous black, with the top and sides of the crown, the throat and under tail-coverts deep bright rufous; the under wing-coverts are white; the bill and feet are black.

Length (skin),  $8\frac{1}{8}$  inches; wing, 4; tail,  $3\frac{1}{8}$ ; tarsus, 1.

As the plumage of the female is similar to that of the male, it seemed so different from the recorded olive-colored plumage of the females of all others of the genus, that I wrote to Mr. Ober, asking if he was confident that the sexes were rightly determined; he replied that he was. I thought this marked difference in the coloring of the female would entitle it to full specific distinction.

In his work on the Birds of Porto Rico, Dr. Gundlach describes the female of *L. portoricensis* as being olive-colored. Therefore I wrote to him stating the close resemblance between the males of the birds from Porto Rico and St. Kitts, and called his attention to the fact that in the latter island the female resembled the male in plumage. He answered that he had just received a letter from his correspondent in Porto Rico, Dr. Stahl, who informed him that the female of *L. portoricensis* was like the male.

Length of ♀, 8 inches; wing,  $3\frac{3}{4}$ ; tail,  $3\frac{1}{8}$ ; tarsus, 1.

Types in the National Museum, Washington.

In the collection from Mr. Ober were nine specimens, one only in the olive-colored plumage, which was marked as a male. The collection also contained specimens of *Loxigilla noctis*.

*Remarks*.—The above-described bird in distribution of colors closely resembles *L. portoricensis*; the only noticeable difference is, that in the Porto Rico species the under wing-coverts are white, lightly marked with rufous. It is, however, larger, the bills as a rule markedly so, but in the only specimen in my collection from Porto Rico the bill is as large as that of the female from St. Kitts chosen as the type; but that of the male is larger.

In quite a large series of *L. portoricensis* belonging to the Smithsonian Institution, the bills average much smaller. Many of these are in the olive-colored plumage, but all are without distinction of sex.

Probably in the two forms from Porto Rico and St. Kitts, all the olive-colored birds are the young of both sexes.

Mr. F. A. Ober visited St. Christopher on his second expedition to the West Indies in 1880, but the time spent there was too limited to

admit of a satisfactory collection of its birds being made. The only one obtained of special interest is that now described.

Mr. Ober's note of it is as follows:

"219. 'Black bird,' ♂, Mt. Misery. May 21, 1880.

"General plumage soft, glossy black; chin and throat, top of head and extending back over the eyes on each side, and under tail-coverts rusty red; bill and feet black. Depth of bill  $\frac{3}{4}$  inch.

"Sexes alike; young male different.

"Length,  $8\frac{1}{2}$  inches; wing,  $4\frac{1}{2}$ ; alar extent, 13."

JUNE 10, 1881.

#### NOTES ON THE MORTALITY AMONG FISHES OF THE GULF OF MEXICO.

By S. H. JOHNSON.

CUSTOM-HOUSE, CORPUS CHRISTI, TEXAS,

*Collector's Office, June 17, 1881.*

Prof. SPENCER F. BAIRD,

*U. S. Commissioner of Fish and Fisheries, Washington, D. C.:*

SIR: Noticing in the Forest and Stream of 9th instant some answers to queries as to the cause of mortality among fishes in the Gulf of Mexico, I make bold to present the result of my observations.

After very heavy rains and overflowing of rivers, the inner bays on the Texas coast suffer a loss of from one-half to three-fourths of their stock of salt-water fish, not including mullet, which live as well in fresh as salt water. In fact land-locked mullet in a fresh-water pond or tank grow to a weight of nine or ten pounds.

Last winter, after a heavy rain and a freeze, *all* the salt-water fish in the *Laguna del Madre* (a large sheet of water lying between Padre Island and the mainland) were found dead on the banks.

We have two causes for destruction of fish here, viz., too much fresh water and too cold weather.

In the lagoon above spoken of, in a long drought, the water gets too salty for the fish, and they become covered with sores, and unless relieved by a rain they die from too much salt.

I have never known any serious mortality among fish on the Gulf coast where there was free flow of water, except during violent storms, when many fish both small and large were beached and killed.

Very respectfully,

S. H. JOHNSON,

*Collector.*

**THE COMPARATIVE ACTION OF DRY HEAT AND SULPHUROUS ACID UPON PUTREFACTIVE BACTERIA.**

Pieces of woolen and cotton cloths and wadding were dipped in a solution of putrefying flesh and slightly dried; and after being shown to be infected by causing discoloration and development of bacteria in a Pateur solution, one portion was subjected to dry heat, and the other to the influence of a definite quantity of sulphurous acid. When these agents had operated for a certain time, the substances were brought into a developing liquid and again observed.

These experiments, which were conducted by Dr. Wermeh, were as follows:

First. Fragments of the materials above referred to, treated as mentioned and dried, produced in sixteen experiments an exceptionally rapid disturbance of the test liquid. In four experiments with wadding this was somewhat retarded. It took place most rapidly in tubes which had been inoculated with woolen thread.

Second. After inoculation with the material which had been exposed one or two minutes to a dry heat of  $284^{\circ}$  to  $300^{\circ}$  F., clouding took place in four of eight experiments; but only after from two to three days. With material which had been exposed from ten to sixty minutes to a heat of  $230^{\circ}$ – $244^{\circ}$  F., in five out of six experiments a development of bacteria took place after the end of twenty-four hours.

Third. Substances which were exposed five minutes to a heat of  $257^{\circ}$  to  $302^{\circ}$  F. produced no infection whatever in ten experiments. The test liquid remained clear for eleven days from the time of inoculation.

Fourth. When the objects were exposed under a bell glass to the action of a percentage, by volume, of 1.5, 2.2, and 3.3 of sulphurous acid, in eight out of nine experiments a bacterial clouding was developed in the sulphurized material, whether the application had continued for one hour or twenty-two.

Fifth. In fifteen experiments, in which sulphurous acid constituted 4.6 and 7.15 per cent., by volume, of the contents of the bell glass, the introduction of the sulphurized material produced no cloudiness, when the experiment continued six hours and more. On the other hand an exposure of 20, 40, 60, and 200 minutes was followed by the development of bacteria.

In conclusion, the fact was considered especially interesting that the different fabrics gave up the infection concealed in them with different degrees of rapidity, the woolen fiber the quickest, the linen less easily, and the wadding with the greatest difficulty of all.

## LIST OF SPECIAL DESIDERATA AMONG NORTH AMERICAN BIRDS.

By ROBERT RIDGWAY.

[The following list includes the species of North American birds specimens of which are particularly desired by the United States National Museum, and which it is hoped that correspondents may be able to supply.]

The species marked with a \* are not represented at all in the collection, consequently specimens in any plumage and of any age will be acceptable. Of those distinguished by a † the collection contains no American specimens, while in the case of others the particular deficiencies are explained. When no remarks follow the name of a species it should be understood that specimens of any stage of plumage are desired.

The numbers and names correspond with those of the new Smithsonian catalogue.]

2. *Hylocichla fuscescens* (Steph.) Baird. Tawny Thrush. (Young in first plumage.)
3. *Hylocichla aliciae* Baird. Gray-cheeked Thrush. (Young in first plumage.)
4. *Hylocichla ustulata* (Nutt.) Baird. Russet-backed Thrush. (Especially first plumage.)
- 4 a. *Hylocichla ustulata swainsoni* (Caban.) Ridgw. Olive-backed Thrush. (First plumage.)
5. *Hylocichla unalascae* (Gmel.) Ridgw. Dwarf Thrush. (First plumage.)
- † [6.] *Turdus iliacus* Linn. Gray-cheeked Thrush. Various stages (autumnal adult only is represented).
8. *Merula confinis* (Baird) Ridgw. Saint Lucas Robin. (Type specimen still unique.)
- 13 a. *Harporhynchus rufus longirostris* (Lafr.) Coues. Mexican Brown Thrasher. (Especially first plumage.)
14. *Harporhynchus cinereus* Xantus. Saint Lucas Thrasher.
- 14 a. *Harporhynchus cinereus bendirei* (Coues) Hensh. Bendire's Thrasher. (Especially first plumage.)
- 15 a. *Harporhynchus curvirostris palmeri* Ridgw. Palmer's Thrasher. (Especially first plumage.)
- 16 a. *Harporhynchus redivivus lecontei* (Lawr.) Coues. Leconte's Thrasher. (Especially first plumage.)
17. *Harporhynchus crissalis* Henry. Rufous-vented Thrasher. (Especially first plumage.)
18. *Harporhynchus graysoni* Baird. Socorro Thrasher. (Especially first plumage.)
- † [20.] *Cyanocula succica* (Linn.) Brehm. Blue-throated Warbler. (American specimens.)



- [21.] *Saxicola oenanthe* (Linn.) Bechst. Stone Chat. (First plumage.)  
 25. *Myiadestes townsendi* (Aud.) Caban. Townsend's Solitaire.  
 28. *Poliophtila plumbea* Baird. Plumbeus Gnatcatcher.  
 29. *Poliophtila californica* Brewster. Black-tailed Gnatcatcher.  
 31. *Regulus obscurus* Ridgw. Dusky Kinglet.  
 \* 32. *Regulus eurieri* Aud. Cuvier's Kinglet.  
 [34.] *Phylloscopus borealis* (Blas.) Dresser. Kennicott's Warbler.  
 35. *Chama fasciata* Gamb. Ground Tit.  
 41 b. *Parus atricapillus occidentalis* (Baird) Cones. Oregon Chickadee.  
 † 43. *Parus meridionalis* Sel. Mexican Chickadee.  
 [44.] *Parus cinctus* Bodd. Siberian Chickadee. (Especially first plumage.)  
 † 49. *Psaltiriparus melanotis* (Hartl.) Bp. Black-eared Tit.  
 † 55 a. *Certhia familiaris mexicana* (Gloger) Ridgw. Mexican Creeper.  
 † (?) 59. *Catherpes mexicanus* (Sw.) Baird. Mexican White-throated Wren. (The supposed occurrence of this form in the United States rests solely upon Giraud's type of his *Certhia albifrons*, said to be from Texas, which is in the National collection.)  
 † 60 a. *Thryothorus ludovicianus berlandieri* (Conch) Cones. Berlandier's Wren.  
 60 b. *Thryothorus ludovicianus miamensis* Ridgw. Florida Wren.  
 62. *Thryomanes brevicauda* Ridgw. Guadalupe Wren.  
 64. *Troglodytes insularis* Baird. Socorro Wren.  
 65. *Anorthura troglodytes hyemalis* (Vieill.) Cones. Winter Wren.  
 65 a. *Anorthura troglodytes pacificus* (Baird.) Ridgw. Western Winter Wren. (First plumage.)  
 † [69.] *Motacilla alba* Linn. White Wagtail.  
 [72.] *Anthus pratensis* (Linn.) Bechst. European Titlark.  
 76. *Helonwa swainsoni* Aud. Swainson's Warbler.  
 78. *Helminthophaga bachmani* (Aud.) Caban. Bachman's Warbler. (Especially the female.)  
 79. *Helminthophaga pinus* (Linn.) Baird. Blue-winged Yellow Warbler. (First plumage.)  
 \* 80. *Helminthophaga lawrencei* Herrick. Lawrence's Warbler.  
 81. *Helminthophaga chrysoptera* (Linn.) Baird. Yellow-winged Warbler. (First plumage.)  
 \* 82. *Helminthophaga leucobronchialis* Brewster. White-throated Warbler.  
 83. *Helminthophaga lucie* Cooper. Lucy's Warbler.  
 84. *Helminthophaga virginiae* Baird. Virginia's Warbler.  
 85. *Helminthophaga ruficapilla* (Wils.) Baird. Nashville Warbler. (First plumage.)  
 87. *Helminthophaga peregrina* (Wils.) Baird. Tennessee Warbler. (First plumage.)  
 89. *Parula pitayumi insularis* (Lawr.) Ridgw. Socorro Warbler. (First plumage.)



- 89 a. *Parula pitiayumi nigrilora* Coues. Sennett's Warbler.
90. *Perissoglossa tigrina* (Gmel.) Baird. Cape May Warbler. (First plumage.)
- \* 91. *Perissoglossa carbonata* (Aud.) Baird. Carbonated Warbler.
92. *Peucedrumus olivaceus* (Giraud) Coues. Olive-headed Warbler. (Especially first plumage.)
94. *Dendræca carulescens* (Linn.) Baird. Black-throated Blue Warbler. (First plumage.)
97. *Dendræca maculosa* (Gmel.) Baird. Black-and-yellow Warbler. (First plumage.)
99. *Dendræca pennsylvanica* (Linn.) Baird. Chestnut-sided Warbler. (First plumage.)
100. *Dendræca castanea* (Wils.) Baird. Bay-breasted Warbler. (First plumage.)
103. *Dendræca dominica* (Linn.) Baird. Yellow-throated Warbler.
- 103 a. *Dendræca dominica albilora* Baird. White-browed yellow-throated Warbler. (First plumage.)
106. *Dendræca chrysoparia* Sel. & Salv. Golden-cheeked Warbler. (A series very desirable.)
108. *Dendræca townsendi* (Nutt.) Baird. Townsend's Warbler. (Especially first plumage.)
110. *Dendræca kirtlandi* Baird. Kirtland's Warbler.
- \* 112 *Dendræca montana* (Wils.) Baird. Blue Mountain Warbler.
113. *Dendræca palmarum* (Gmel.) Baird. Red-poll Warbler. (First plumage.)
114. *Dendræca discolor* (Vieill.) Baird. Prairie Warbler. (First plumage.)
- \* 116 u. *Siurus naevius notabilis* Grinnell. Grinnell's Water Thrush.
118. *Oporornis agilis* (Wils.) Baird. Connecticut Warbler. (Especially first plumage.)
120. *Geothlypis philadelphia* (Wils.) Baird. Mourning Warbler. (First plumage.)
121. *Geothlypis macgillivrayi* (Aud.) Baird. Macgillivray's Warbler. (First plumage.)
- \* 126. *Myiodioctes minutus* (Wils.) Baird. Small-headed Flycatcher.
127. *Myiodioctes canadensis* (Linn.) Aud. Canadian Flycatching Warbler. (First plumage.)
- † (?) 130. *Setophaga miniata* Swains. Red-bellied Redstart. (Giraud's type of his "*Muscicapa derhami*," said to be from Texas, is in the National Museum collection.)
- † (?) 132. *Ergaticus ruber* (Swains.) Baird. Red Warbler. (The type specimen of Giraud's "*Parus leucotis*" is in the collection, and is said to have been obtained in Texas.)
- † (?) 133. *Basileuterus culicivorus* (Licht.) Bonap. Brasher's Warbler. (Type of "*Muscicapa brasieri*" Giraud, said to have been obtained in Texas, is in the collection.)

- (?) 134. *Basileuterus belli* (Giraud) Sel. Bell's Warbler. (The type specimen, one of Giraud's "Sixteen Species of Texan Birds," is in the collection.)
135. *Vireosylwia oliracea* (Linn.) Bp. Red-eyed Vireo. (First plumage.)
136. *Vireosylwia agilis flavo-viridis* (Cass.) Ridgw. Yellow-green Vireo. (Especially first plumage.)
137. *Vireosylwia calidris barbatula* (Caban.) Ridgw. Black-whiskered Vireo. (Especially first plumage.)
138. *Vireosylwia philadelphia* Cass. Philadelphia Vireo. (Especially first plumage.)
140. *Lanivireo flavifrons* (Vieill.) Baird. Yellow-throated Vireo. (First plumage.)
141. *Lanivireo solitarius* (Vieill.) Baird. Blue-headed Vireo. (First plumage.)
142. *Vireo atricapillus* Woodh. Black-capped Vireo.
143. *Vireo noveboracensis* (Gm.) Bp. White eyed Vireo. (First plumage.)
144. *Vireo huttoni* Cass. Hutton's Vireo.
147. *Vireo vicinior* Coues. Gray Vireo.
148. *Lanius borealis* Vieill. Great Northern Shrike. (First plumage.)
- \* 149 b. *Lanius ludovicianus robustus* Baird. Large-billed Shrike.
150. *Ampelis garrulus* Linn. Northern Wax-wing. (First plumage.)
- 152 a. *Progne subis cryptoleuca* Baird. Cuban Martin.
159. *Certhiola bahamensis* Reich. Bahaman Honey Creeper.
- † (?) 160. *Euphonia elegantissima* (Bp.) Gray. Blue-headed Euphonia. (The only presumably North American specimen of this species in the collection is the type of "*Pipra galericulata*" of Giraud.)
163. *Pyranga hepatica* Swains. Hepatic Tanager.
- 164 a. *Pyranga astiva cooperi* Ridgw. Cooper's Tanager.
165. *Hesperiphona vespertina* (Cooper) Bp. Evening Grosbeak.
- [167.] *Pyrrhula cassini* Baird. Cassin's Purple Finch.
171. *Carpodacus amplus* Ridgw. Guadalupe House Finch.
175. *Leucosticte tephrocotis* Swains. Gray-crowned Rosy Finch. (Summer adults and young in first plumage.)
- 175 a. *Leucosticte tephrocotis littoralis* (Baird) Coues. Hepburn's Rosy Finch. (Summer adults and young in first plumage.)
176. *Leucosticte atrata* Ridgw. Black Rosy Finch. (A series especially desired.)
177. *Leucosticte australis* Allen. Brown-capped Rosy Finch. (Especially winter specimens and young in first plumage.)
178. *Ægiothus canescens* Gould. Mealy Redpoll.
- 179 a. *Ægiothus linaria holbolli* (Brehm) Ridgw. Greater Redpoll.
- \* 180. *Ægiothus brewsteri* Ridgw. Brewster's Linnet.
- 182 a. *Astragalinus psaltria arizonæ* Coues. Arizona Goldfinch.
- † (?) 182 b. *Astragalinus psaltria mexicanus* (Sw.) Coues. Mexican Goldfinch. (With the exception of the type of Giraud's "*Fringilla texensis*" there is no North American example of this form in the collection.)

- †184. *Chrysometris notata* (Du Bus) Bp. Black-headed Goldfinch.
188. *Centrophanes pictus* (Sw.) Caban. Smith's Longspur. (First plumage; also adults in summer.)
192. *Passerculus princeps* Maynard. Ipswich Sparrow. (A good series showing individual variations very much desired.)
193. *Passerculus sandwichensis* (Gmel.) Baird. Sandwich Sound Sparrow.
194. *Passerculus anthinus* Bonap. Titlark Sparrow.
195. *Passerculus guttatus* Lawr. Saint Lucas Sparrow.
196. *Passerculus rostratus* (Cass.) Baird. Large-billed Sparrow. (First plumage.)
199. *Coturniculus henslowi* (Aud.) Bp. Henslow's Sparrow.
200. *Coturniculus lecontei* (Aud.) Bp. Leconte's Sparrow.
- 201 a. *Ammodromus caudacutus nelsoni* Allen. Nelson's Sharp-tailed Finch. (The young in first plumage particularly desired.)
203. *Ammodromus nigrescens* Ridgw. Black-and-White Sea-side Finch. (A good series much wanted.)
205. *Zonotrichia querula* (Nutt.) Gamb. Harris's Sparrow. (Young in first plumage a special desideratum.)
207. *Zonotrichia gambeli* (Nutt.) Gamb. Gambel's White-crowned Sparrow. (A good series of adults and the young in first plumage.)
215. *Spizella atrigularis* (Caban.) Bd. Black-chinned Sparrow.
216. *Junco aikenii* Ridgw. White-winged Snowbird. (Especially the young in first plumage, and adults in summer plumage.)
219. *Junco annectens* Baird. Pink-sided Snowbird. (Particularly young in first plumage.)
221. *Junco dorsalis* Henry. Red-backed Snowbird.
222. *Junco cinereus* (Swains.) Caban. Mexican Snowbird.
223. *Junco insularis* Ridgw. Guadalupe Snowbird.
225. *Amphispiza belli* (Cass.) Coues. Bell's Sparrow. (Particularly young in first plumage.)
226. *Peucea aestivalis* (Licht.) Caban. Bachman's Finch. (Young in first plumage an especial desideratum; adults also wanted.)
- 226 a. *Peucea aestivalis illinoensis* Ridgw. Oak-wood's Sparrow. (Young in first plumage a particular desideratum.)
227. *Peucea arizonae* Ridgw. Arizona Sparrow.
228. *Peucea cassini* (Woodh.) Baird. Cassin's Sparrow.
229. *Peucea carpalis* Coues. Rufous-winged Sparrow.
230. *Peucea ruficeps* (Cass.) Baird. Rufous-crowned Sparrow.
- 230 a. *Peucea ruficeps boucardi* (Sel.). Boucard's Sparrow.
- 231 c. *Melospiza fasciata samuelis* Baird. Californian Song Sparrow.
- 231 e. *Melospiza fasciata rufina* (Brandt.) Baird. Sooty Song Sparrow.
- 235 c. *Passerella iliaca schistacea* (Baird) Allen. Slate-colored Sparrow.
236. *Embernagra rufivirgata* Lawr. Texas Sparrow. (Especially young in first plumage.)
- 237 a. *Pipilo erythrophthalmus allenii* Coues. Florida Towhee. (Especially young in first plumage.)

238. *Pipilo maculatus arcticus* (Swains.) Coues. Northern Towhee.  
 238 b. *Pipilo maculatus oregonus* (Bell.) Coues. Oregon Towhee.  
 238 c. *Pipilo maculatus consobrinus* Ridgw. Guadalupe Towhee.  
 238 d. *Pipilo maculatus carmani* Baird. Socorro Towhee.  
 240 a. *Pipilo fuscus albigula* (Baird) Coues. Saint Lucas Brown Towhee.  
 242 a. *Cardinalis virginianus igneus* (Baird) Coues. Saint Lucas Cardinal.  
 †247. *Passerina parellina* (Bp.) Ridgw. Blue Bunting.  
 250. *Passerina versicolor* (Bonap.) Gray. Varied Bunting.  
 252. *Spermophila moreletii* Pucheran. Morelet's Seedeater.  
 †253. *Phonipara zena* (Linn.) Bryant. Black-faced Seedeater.  
 255. *Spiza townsendi* (Aud.) Ridgw. Townsend's Bunting. (Type still unique.)  
 262. *Agelaius tricolor* (Nutt.) Bp. Red-and-white-shouldered Blackbird.  
 263 a. *Sturnella magna mexicana* (Scl.) Ridgw. Mexican Meadow Lark.  
 265. *Icterus vulgaris* Daud. Troupial.  
 266. *Icterus auduboni* Giraud. Audubon's Oriole. (Especially young in first plumage, and intermediate stages.)  
 †267. *Icterus wagleri* Scl. Wagler's Oriole.  
 268. *Icterus parisorum* Bonap. Scott's Oriole.  
 269. *Icterus cucullatus* Swains. Hooded Oriole.  
 278 a. *Quiscalus purpureus aglaeus* (Baird) Coues. Florida Grackle.  
 †[279.] *Sturnus vulgaris* Linn. European Starling.  
 281. *Corvus cryptoleucus* Couch. White-necked Raven.  
 282 b. *Corvus frugivorus caurinus* (Baird) Ridgw. Northwestern Fish Crow.  
 287. *Pica nuttalli* Aud. Yellow-billed Magpie.  
 †288. *Psilorhinus morio* (Wagl.) Gray. Brown Jay.  
 291. *Aphelocoma floridana* (Bartr.) Caban. Florida Jay. (Especially young in first plumage.)  
 †294. *Aphelocoma ultramarina couchi* Baird. Couch's Jay.  
 295. *Aphelocoma sordida arizonæ* Ridgw. Arizona Jay.  
 296. *Xanthura luxuosa* (Less.) Bp. Green Jay. (Especially young in first plumage.)  
 297. *Perisoreus canadensis* (Linn.) Bp. Canada Jay.  
 298. *Perisoreus obscurus* Ridgw. Oregon Jay.  
 †[299.] *Alauda arvensis* Linn. Sky Lark.  
 †[302.] *Milvulus tyrannus* (Linn.) Bp. Fork-tailed Flycatcher.  
 303. *Tyrannus dominicensis* (Gm.) Reich. Gray Kingbird.  
 305. *Tyrannus melancholicus couchi* Baird. Couch's Kingbird.  
 †(?) 309. *Myiozetetes texensis* (Giraud) Scl. Giraud's Flycatcher. (The type specimen of this species is the only specimen in the collection from north of Mexico, and the locality of this is perhaps somewhat doubtful.)  
 †(?) 314. *Myiarchus lawrencei* (Giraud) Baird. Lawrence's Flycatcher. (No North American specimen in the collection, except the type of the species, said to be from Texas.)



- 323. *Empidonax difficilis* Baird. Western Yellow-bellied Flycatcher.
- †(?) 329. *Empidonax fulvifrons* (Giraud) Sel. Fulvous Flycatcher. (The  
\* same remarks apply to this as to No. 314).
- 329 a. *Empidonax fulvifrons pallescens* Cones. Buff-breasted Flycatcher.
- †332. *Pachyrhamphus major* (Bonap.) Sel. Thick-billed Flycatcher.
- †333. *Hadrostomus aglaie* (Lafr.) Cab. Rose-throated Flycatcher.
- 341. *Selasphorus alleni* Hensh. Allen's Hummingbird.
- 342. *Atthis heloisea* (Less.) Reich. Heloise's Hummingbird.
- 344. *Calothorax lucifer* (Swains.) Gray. Lucifer Hummingbird.
- 347. *Basilinna xantusi* (Lawr.) Elliott. Xantus's Hummingbird.
- 349. *Cypselus saxatilis* Woodh. White-throated Swift. (Especially  
young in first plumage.)
- 350. *Cypseloides niger borealis* (Keunernerly) Ridgw. Black Swift.
- 352. *Chatura vauxi* (Townsend) De Kay. Vaux's Swift.
- 359. *Campephilus principalis* (Linn.) Gray. Ivory-billed Woodpecker.  
(Especially young, of both sexes.)
- 362. *Picus querulus* Wils. Red-cockaded Woodpecker. (Especially  
young.)
- 363 a. *Picus scalaris lucasianus* (Xant.) Ridgw. Saint Lucas Wood-  
pecker.
- 365. *Picus stricklandi* Malh. Strickland's Woodpecker.
- 367. *Picoides arcticus* (Swains.) Gray. Black-backed Three-toed Wood-  
pecker. (Especially young, of both sexes.)
- 368. *Picoides tridactylus americanus* (Brehm.) Ridgw. Banded-backed  
Three-toed Woodpecker. (A good series wanted from Maine or the  
British Provinces.)
- 369 b. *Sphyrapicus varius ruber* (Gm.) Ridgw. Red-breasted Woodpecker.
- 377 a. *Melanerpes formicivorus angustifrons* Baird. Narrow-fronted Wood-  
pecker.
- 378 a. *Colaptes auratus hybridus* (Baird) Ridgw. "Hybrid" Flicker.  
(Especially Eastern specimens with red feathers in the black check-  
stripes.)
- 379. *Colaptes chrysoides* (Malh.) Baird. Malherbe's Flicker.
- 380. *Colaptes rufipileus* Ridgw. Guadalupe Flicker. (Adult male un-  
known!)
- †381. *Momotus caruleiceps* Gould. Blue-capped Motmot.
- 383. *Ceryle americana cabanisi* (Tschudi) Cones. Texan Kingfisher.
- †384. *Trogon ambiguus* Gould. Coppery-tailed Trogon.
- 386. *Coccyzus seniculus* (Lath.) Vieill. Mangrove Cuckoo.
- 389. *Crotophaga ani* Linn. Savannah Blackbird.
- \* 391. *Rhynchopsitta pachyrhyncha* (Swains.) Bp. Thick-billed Parrot.
- 392. *Conurus carolinensis* (Linn.) Kuhl. Carolina Parakeet.
- 393. *Conurus holochlorus brevipes* Baird. Socorro Parakeet.
- 394. *Aluco flammeus americanus* (Aud.) Ridgw. American Barn Owl.  
(Especially downy young.)



395. *Asio americanus* (Steph.) Sharpe. American Long-eared Owl.  
(Downy young.)
396. *Asio accipitrinus* (Pall.) Newton. Short-eared Owl. (Downy young.)
397. *Strix nebulosa* Forst. Barred Owl. (Downy young.)
- 397 a. *Strix nebulosa alleni* Ridgw. Florida Barred Owl.
398. *Strix occidentalis* (Xant.) Ridgw. Spotted Owl. (Especially downy young.)
399. *Ulula cinerea* (Gmel.) Bp. Great Gray Owl. (Especially downy young.)
- [399 a]. *Ulula cinerea lapponica* (Retz.) Ridgw. Lapland Owl. (Especially downy young.)
400. *Nyctale tengmalmi richardsoni* (Bp.) Ridgw. Richardson's Owl.
401. *Nyctale acadica* (Gmel.) Bp. Saw-whet Owl. (Especially young.)
402. *Scops asio* (Linn.) Bp. Little Screech Owl. (Downy young.)
- 402 a. *Scops asio floridanus* Ridgw. Florida Screech Owl.
- 402 b. *Scops asio maccalli* (Cass.) Ridgw. Texan Screech Owl.
- 402 c. *Scops asio maxcellie* Ridgw. Rocky Mountain Screech Owl.
- 402 d. *Scops asio kennicotti* (Elliot) Ridgw. Northwestern Screech Owl.
403. *Scops trichopsis* Wagl. Mexican Screech Owl.
404. *Scops flammeolus* (Licht.) ScL. Flammulated Screech Owl.
405. *Bubo virginianus* (Gm.) Bp. Great Horned Owl. (Very young in down.)
- 405 a. *Bubo virginianus subarcticus* (Hoy) Ridgw. Western Horned Owl.
- \*405 b. *Bubo virginianus arcticus* (Swains.) Cass. Arctic Horned Owl.
- 405 c. *Bubo virginianus saturatus* Ridgw. Dusky Horned Owl.
406. *Nyctea scandiaca* (Linn.) Newt. Snowy Owl. (Downy young.)
407. *Surnia funerea* (Linn.) Rich & Sw. American Hawk Owl. (Downy young.)
- †[407.] *Surnia funerea ulula* (Linn.) Ridgw. European Hawk Owl. (Especially downy young.)
- 408 a. *Speotyto cunicularia floridana* Ridgw. Florida Burrowing Owl.
409. *Glaucidium gnoma* Wagl. California Pigmy Owl. (Especially downy young.)
410. *Glaucidium phalaenoides* (Daud.) ScL. and Salv. Ferruginous Pigmy Owl. (Especially downy young.)
411. *Micrathene whitneyi* (Cooper) Cones. Whitney's Pigmy Owl. (Especially downy young.)
412. *Hierofalco gyrfalco candicans* (Gm.) Ridgw. White Gyrfalcon. (Especially downy young.)
- 412 a. *Hierofalco gyrfalco islandus* (Gm.) Ridgw. Iceland Gyrfalcon. (Adults and downy young.)
- 412 b. *Hierofalco gyrfalco sacer* (Forst.) Ridgw. McFarlane's Gyrfalcon. (Series, especially adults.)
- 412 c. *Hierofalco gyrfalco obsoletus* (Gm.) Ridgw. Labrador Gyrfalcon. (A good series of both old and young wanted.)

413. *Hierofalco mexicanus polyagrus* (Cass.) Ridgw. Prairie Falcon. (Especially adults and downy young.)
414. *Falco peregrinus navius* (Gm.) Ridgw. American Peregrine Falcon; Duck Hawk. (Adults and downy young.)
- 414 a. *Falco peregrinus pealei* Ridgw. Peale's Falcon.
- †415. *Falco albicularis* Daud. Chestnut-thighed Falcon.
- † [416.] *Esalon regulus* (Pall.) Blyth. European Merlin. (Good series of all stages wanted.)
417. *Esalon columbarius* (Linn.) Kaup. Pigeon Hawk.
- 417 a. *Esalon columbarius suckleyi* Ridgw. Black Merlin.
418. *Esalon richardsoni* Ridgw. Richardson's Merlin. (Especially fully adult male and downy young.)
419. *Rhynchofalco fusco-cerulescens* (Vieill.) Ridgw. Aplomado Falcon. (Especially downy young.)
- 420 a. *Tinnunculus sparverius isabellinus* (Swains.) Ridgw. Isabelline Sparrow Hawk.
421. *Tinnunculus sparverioides* (Vig.) Gray. Cuban Sparrow Hawk.
425. *Pandion haliaetus carolinensis* (Gm.) Ridgw. American Osprey; Fish Hawk. (Downy young.)
426. *Elanoides forficatus* (Linn.) Ridgw. Swallow-tailed Kite. (Especially downy young; good adults also wanted.)
- 427 *Elanus glaucus* (Bartr.) Cones. White-tailed Kite. (Especially downy young.)
428. *Ictinia subcerulea* (Bartr.) Cones. Mississippi Kite. (Especially downy young.)
429. *Rostrhamus sociabilis plumbeus* Ridgw. Everglade Kite. (Especially downy young.)
431. *Accipiter cooperi* Bonap. Cooper's Hawk. (Downy young.)
432. *Accipiter fuscus* (Gmel.) Bp. Sharp-shinned Hawk. (Downy young.)
433. *Astur atricapillus* (Wils.) Bp. American Goshawk. (Downy young; also good adults.)
- 433 a. *Astur atricapillus striatulus* Ridgw. Western Goshawk.
434. *Antenor unicinctus harrisi* (Aud.) Ridgw. Harris's Hawk.
436. *Buteo borealis* (Gm.) Vieill. Red-tailed Hawk. (Downy young.)
- \* 436 a. *Buteo borealis krideri* Hoopes. Krider's Hawk.
- 436 b. *Buteo borealis calurus* (Cass.) Ridgw. Western Red-tail. (Melanotic specimens.)
- 436 c. *Buteo borealis lucasanus* Ridgw. Saint Lucas Red-tail.
- 436 d. *Buteo borealis socorroensis* Ridgw. Socorro Red-tail.
437. *Buteo cooperi* Cass. Cooper's Henhawk.
438. *Buteo harrani* Aud. Harlan's Hawk.
439. *Buteo lineatus* (Gm.) Jard. Red-shouldered Hawk. (Downy young.)
- 439 a. *Buteo lineatus elegans* (Cass.) Ridgw. Red-bellied Hawk.

440. *Buteo abbreviatus* Caban. Zone-tailed Hawk. (Especially downy young.)
441. *Buteo albicaudatus* Vieill. White-tailed Hawk. (Especially downy young.)
442. *Buteo swainsoni* Bonap. Swainson's Hawk. (Especially downy young.)
443. *Buteo pennsylvanicus* (Wils.) Bp. Broad-winged Hawk. (Downy young; also adults.)
- † 444. *Urubitinga anthracina* (Licht.) Lafr. Mexican Black Hawk. (Especially downy young.)
445. *Asturina nitida plagiata* (Licht.) Ridgw. Mexican Goshawk. (Especially downy young.)
446. *Onychotes gruberi* Ridgw. Gruber's Hawk. (Only two specimens known to exist in collections!)
447. *Archibuteo lagopus sancti-johannis* (Gmel.) Ridgw. American Rough-legged Hawk. (Downy young and melanotic specimens.)
448. *Archibuteo ferrugineus* (Licht.) Gray. Ferruginous Rough-leg. (Especially downy young and melanotic specimens.)
449. *Aquila chrysaetus canadensis* (Linn.) Ridgw. Golden Eagle. (Especially downy young.)
- † 450. *Thrasaetus harpyia* (Linn.) Gray. Harpy Eagle.
- † 452. *Haliaeetus albicilla* (Linn.) Leach. Gray Sea Eagle. (Greenland specimens.)
453. *Pseudogryphus californianus* (Shaw) Ridgw. California Condor. (Adults and downy young.)
454. *Cathartes aura* (Linn.) Illig. Turkey Buzzard. (Downy young.)
455. *Catharista atrata* (Wils.) Less. Black Vulture; Carrion Crow. (Downy young.)
461. *Zenaidura graysoni* Baird. Socorro Dove.
462. *Zenaida amabilis* Bp. Zenaida Dove.
467. *Geotrygon martinica* (Gm.) Bp. Key West Dove.
- † 468. *Starnoenas cyanocephala* (Linn.) Bp. Blue-headed Dove.
469. *Ortalis vetula macalli* (Baird) Ridgw. Chachalaca; Texan Guan. (Especially downy young.)
470. *Meleagris gallopavo* Linn. Mexican Turkey. (Downy young and young in first plumage.)
- 470 a. *Meleagris gallopavo americana* (Bartr.) Coes. Wild Turkey. (Downy young and young in first plumage.)
- 471 a. *Canace obscura fuliginosa* Ridgw. Sooty Grouse.
- 471 b. *Canace obscura richardsoni* (Dougl.) Baird. Richardson's Grouse.
472. *Canace canadensis* (Linn.) Bp. Canada Grouse; Spruce Partridge. (Downy young.)
- 472 a. *Canace canadensis franklini* (Dougl.) Baird. Franklin's Grouse.
- 473 a. *Bonasa umbellus umbelloides* (Dougl.) Baird. Gray Ruffed Grouse. (Downy young and young in first plumage.)

- 473 *b. Bonasa umbellus sabinei* (Dougl.) Coues. Oregon Ruffed Grouse. (Young in down and in first plumage.)
475. *Lagopus rupestris* (Gm.) Leach. Rock Ptarmigan. (Adults in summer plumage and downy young.)
476. *Lagopus leucurus* Sw. White-tailed Ptarmigan. (Downy young and adults in winter plumage.)
- 477 *a. Cupidonia cupido pallidicincta* Ridgw. Lesser Prairie Hen. (Especially young in first plumage and in down.)
478. *Pediæcetes phasianellus* (L.) Elliot. Northern Sharp-tailed Grouse. (Especially young in first plumage and in down.)
- 480 *a. Ortyx virginiana floridana* Coues. Florida Quail. (Especially chick and young in first plumage.)
- 480 *b. Ortyx virginiana texana* (Lawr.) Coues. Texan Quail. (Especially chick and young in first plumage.)
481. *Oreortyx picta* (Dougl.) Baird. Mountain Quail. (Chick.)
- 481 *a. Oreortyx picta plumifera* (Gould) Ridgw. Plumed Quail. (Chick.)
484. *Callipepla squamata* (Vig.) Gray. Scaled Quail. (Chick and young in first plumage.)
486. *Ardea occidentalis* Aud. Great White Heron; Würdemann's Heron. (A series including all ages and phases of plumage much needed.)
- †499. *Mycteria americana* Linn. Jabiru.
500. *Tantalus loculator* Linn. Wood Ibis. (Downy young.)
501. *Eudocimus albus* (Linn.) Wagl. White Ibis. (Downy young.)
- †502. *Eudocimus ruber* (Linn.) Wagl. Scarlet Ibis. (Downy young.)
503. *Plegadis fuleinellus* (Linn.) Kaup. Glossy Ibis. (Especially downy young.)
505. *Ajaja rosca* (Reich.). Roseate Spoonbill. (Downy young.)
- †[506]. *Hematopus ostragelus* Linn. European Oystercatcher. (Young in first plumage and in down.)
508. *Hematopus niger* Pall. Black Oystercatcher. (Young in first plumage and in down.)
509. *Streptilas interpres* (Linn.) Illig. Turnstone. (Downy young.)
510. *Streptilas melanocephala* Vig. Black Turnstone. (Downy young.)
511. *Aphriza virgata* (Gmel.) Gray. Surf Bird. (Downy young.)
- †[512.] *Vanellus cristatus* Meyer. Lapwing. (American specimens.)
513. *Squatarola helvetica* (Linn.) Cuv. Black-bellied Plover. (Downy young.)
- †[514.] *Charadrius pluvialis* Linn. Golden Plover. (Greenland specimens; also downy young.)
515. *Charadrius dominicus* Müll. American Golden Plover. (Downy young.)
- [515 *a.*] *Charadrius dominicus fulvus* (Gmel.) Ridgw. Pacific Golden Plover. (Summer adults and downy young.)
518. *Ægialites hiaticula* (Linn.) Boie. Ringed Plover. (Downy young.)
- [519.] *Ægialites curonicus* (Gmel.) Gray. Little Ringed Plover. (Downy young.)



520. *Ægialites melodus* (Ord.) Bp. Piping Plover. (Downy young.)
- 520 a. *Ægialites melodus circumcinctus* Ridgw. Belted Piping Plover. (Series of adults; downy young.)
- †[524.] *Scolopax rusticula* Linn. European Woodcock. (American specimens.)
- †[526.] *Gallinago media* Leach. English Snipe. (Greenland specimens; downy young.)
- 526 a. *Gallinago media wilsoni* (Temm.) Ridgw. Wilson's Snipe. (Downy young.)
527. *Macrorhamphus griseus* (Gmel.) Leach. Red-breasted Snipe; Gray Snipe. (Downy young.)
- 527 a. *Macrorhamphus griseus scolopaceus* (Say) Coues. Red-bellied Snipe; Greater Gray-back. (Downy young.)
528. *Micropalama himantopus* (Bonap.) Baird. Stilt Sandpiper. (Downy young.)
529. *Tringa canutus* Linn. Knot; Robin Snipe. (Downy young.)
- [533.] *Actodromas acuminata* (Horsf.) Ridgw. Sharp-tailed Sandpiper. (Summer adults and downy young.)
534. *Actodromas maculata* (Vieill.) Coues. Pectoral Sandpiper. (Downy young.)
535. *Actodromas cooperi* (Baird) Coues. Cooper's Sandpiper. (Type still unique!)
536. *Actodromas fuscicollis* (Vieill.) Ridgw. Bonaparte's Sandpiper. (Downy young.)
537. *Actodromas bairdi* Coues. Baird's Sandpiper. (Downy young.)
538. *Actodromas minutilla* (Vieill.) Bp. Least Sandpiper. (Downy young.)
- †[539.] *Pelidna alpina* (Linn.) Boie. European Dunlin. (American specimens; downy young.)
- 539 a. *Pelidna alpina americana* Cass. Red-backed Sandpiper. (Downy young.)
- [540.] *Pelidna subarquata* (Guld.) Cuv. Curlew Sandpiper. (Downy young.)
542. *Calidris arenaria* (Linn.) Illig. Sanderling. (Downy young.)
543. *Limosa fœda* (Linn.) Ord. Marbled Godwit. (Downy young.)
544. *Limosa lapponica novæ-zealandiæ* Gray. Pacific Godwit. (Downy young.)
545. *Limosa hæmastica* (Linn.) Coues. Hudsonian Godwit. (Downy young.)
- †[546.] *Limosa ægocephala* (Linn.) Leach. Black-tailed Godwit. (American specimens; downy young.)
- [547.] *Totanus glottis* (Linn.) Bechst. Green-shank. (Downy young.)
548. *Totanus melanoleucus* (Gmel.) Vieill. Greater Yellow-legs; Tell-tale. (Downy young.)
549. *Totanus flavipes* (Gmel.) Vieill. Yellow-legs. (Downy young.)



550. *Rhyacophilus solitarius* (Wils.) Cass. Solitary Sandpiper. (Downy young.)
- †[551.] *Rhyacophilus ochropus* (Linn.) Ridgw. Green Sandpiper. (American specimens; downy young.)
552. *Symphemia semipalmata* (Gmel.) Hartl. Willet. (Downy young.)
553. *Heteroscelus incanus* (Gmel.) Cones. Wandering Tattler. (Downy young.)
- [564.] *Machetes pugnax* (Linn.) Cuv. Ruff. (Downy young.)
556. *Tryngites rufescens* (Vieill.) Caban. Buff-breasted Sandpiper. (Downy young.)
559. *Numenius hudsonicus* Lath. Hudsonian Curlew. (Downy young.)
560. *Numenius borealis* (Forst.) Lath. Eskimo Curlew. (Downy young.)
- †[561.] *Numenius phaeopus* (Linn.) Lath. Whimbrel. (American specimens; downy young.)
- [562.] *Numenius tahitiensis* (Gmel.) Cass. Bristle-thighed Curlew. (Downy young.)
563. *Phalaropus fulicarius* (Linn.) Bp. Red Phalarope. (Downy young.)
566. *Recurvirostra americana* Gmel. American Avocet. (Downy young.)
- †568. *Parra gymnostoma* Wagl. Mexican Jacana. (United States specimens; downy young.)
570. *Rallus obsoletus* Ridgw. California Clapper Rail.
- 571 a. *Rallus longirostris saturatus* Hensh. Louisiana Clapper Rail.
- ? 572. *Rallus virginianus* Linn. Virginia Rail. (Downy young.)
- †[573.] *Porzana maruetta* (Leach) Bp. Spotted Crake. (American specimens; downy young.)
575. *Porzana noveboracensis* (Gmel.) Baird. Little Yellow Rail. (Downy young.)
576. *Porzana jamaicensis* (Gmel.) Baird. Little Black Rail. (Downy young.)
- 576 a. *Porzana jamaicensis coturniculus* Baird. Farallone Rail. (Series; also downy young.)
- †[577.] *Crex pratensis* Bechst. Corn Crake. (American specimens.)
578. *Ionornis martinica* (Linn.) Reieh. Purple Gallinule. (Downy young.)
581. *Aramus pictus* (Bartr.) Cones. Limpkin. (Downy young.)
582. *Grus americana* (Linn.) Temm. Whooping Crane. (Downy young.)
583. *Grus canadensis* (Linn.) Temm. Sandhill Crane. (Downy young.)
584. *Grus fraterculus* Cass. Little Crane. (Downy young.)
585. *Phœnicopterus ruber* Linn. American Flamingo. (Good adults, young, and downy young.)
- †[586.] *Olor cygnus* (Linn.) Bp. European Swan. (American specimens; downy young.)
- \*[587.] *Olor minor* (Pall.) Bp. Bewick's Swan.
589. *Olor buccinator* (Rich.) Wagl. Trumpeter Swan. (Downy young.)
590. *Chen caerulescens* (Linn.) Ridgw. Blue-winged Goose. (Downy young.)

591. *Chen hyperboreus* (Pall.) Boie. Snow Goose. (Downy young.)  
 591 a. *Chen hyperboreus albatrus* (Cass.) Ridg. Lesser Snow Goose. (Downy young.)  
 592. *Chen rossi* (Baird) Ridgw. Ross's Snow Goose. (Downy young.)  
 †[593.] *Anser albifrons* Gmel. European White-fronted Goose. (Greenland specimens; downy young.)  
 593 a. *Anser albifrons gambeli* (Hartl.) Coues. American White-fronted Goose. (Downy young.)  
 594 c. *Bernicla canadensis occidentalis* (Baird) Dall & Bann. Larger White-cheeked Goose. (Especially downy young.)  
 595. *Bernicla brenta* (Pall.) Steph. Brant. (Downy young.)  
 596. *Bernicla nigricans* (Lawr.) Cass. Black Brant. (Young in first plumage and in down.)  
 [597.] *Bernicla leucopsis* (Temm.) Boie. Barnacle Goose. (Downy young.)  
 598. *Philacte canagica* (Sevast.) Bannist. Emperor Goose. (Downy young.)  
 600. *Dendrocygna fulva* (Gmel.) Burm. Fulvous Tree Duck. (Downy young.)  
 603. *Anas fulvigula* Ridgw. Florida Dusky Duck. (Series; downy young.)  
 604. *Chaulelasmus streperus* (Linn.) Gray. Gadwall. (Downy young.)  
 [606.] *Mareca penelope* (Linn.) Selby. Widgeon. (Downy young.)  
 609. *Querquedula discors* (Linn.) Steph. Blue-winged Teal. (Downy young.)  
 [611.] *Nettion crecca* (Linn.) Kaup. English Teal. (Downy young.)  
 612. *Nettion carolinensis* (Gmel.) Baird. Green-winged Teal. (Downy young.)  
 614. *Fulix marila* (Linn.) Baird. Scaup Duck. (Downy young.)  
 615. *Fulix affinis* (Eyt.) Baird. Little Blackhead. (Downy young.)  
 616. *Fulix collaris* (Donov.) Baird. Ring-billed Blackhead. (Downy young.)  
 617. *Æthya vallisneria* (Wils.) Boie. Canvas-back. (Downy young.)  
 619. *Clangula islandica* (Gmel.) Bp. Barrow's Golden-eye. (Downy young.)  
 621. *Clangula albeola* (Linn.) Steph. Butterball; Bufflehead. (Downy young.)  
 622. *Histrionicus minutus* (Linn.) Dresser. Harlequin Duck. (Downy young.)  
 623. *Harelda glacialis* (Linn.) Leach. Long-tailed Duck; Old Squaw. (Downy young.)  
 624. *Camptolemus labradorius* (Gmel.) Gray. Labrador Duck. (Especially downy young.)  
 625. *Polysticta stelleri* (Pall.) Brandt. Steller's Duck. (Downy young.)  
 626. *Lampronetta fischeri* Brandt. Spectacled Eider. (Downy young.)  
 627. *Somateria mollissima* (Linn.) Boie. Common Eider. (Downy young.)

- 627 a. *Somateria mollissima dresseri* (Sharpe) Coues. American Eider. (Downy young.)
629. *Somateria spectabilis* (Linn.) Boie. King Eider. (Downy young.)
630. *Edemia americana* Sw. & Rich. American Scoter. (Downy young.)
- † [631.] *Melanetta fusca* (Linn.) Boie. Velvet Scoter. (American specimens; downy young.)
632. *Melanetta velutina* (Cass.) Baird. American Velvet Scoter. (Downy young.)
633. *Pelionetta perspicillata* (Linn.) Kaup. Surf Duck. (Downy young.)
- † 635. *Nomonyx dominicus* (Linn.) Ridgw. Black Masked Duck. (Adult male with black head, and downy young.)
636. *Mergus merganser americanus* (Cass.) Ridgw. American Sheldrake. (Downy young.)
644. *Phalacrocorax mexicanus* (Brandt) Sel. & Salv. Mexican Cormorant. (Adults in nuptial plumage.)
- \* 648. *Phalacrocorax perspicillatus* Pall. Pallas's Cormorant.
657. *Pagophila eburnea* (Phipps) Kaup. Ivory Gull. (Downy young.)
661. *Larus leucopterus* Faber. White-winged Gull. (Downy young.)
662. *Larus glaucescens* Licht. Glaucous-winged Gull. (Downy young.)
- \* [665.] *Larus affinis* Reinh. Siberian Gull.
667. *Larus cachinnans* Pall. Pallas's Herring Gull. (Series, especially young and downy young.)
669. *Larus delawarensis* Ord. Ring-billed Gull. (Downy young.)
670. *Larus brachyrhynchus* Rich. Short-billed Gull. (Downy young.)
- [671.] *Larus canus* Linn. Mew Gull. (Downy young.)
672. *Larus heermanni* Cass. Heerman's Gull. (Downy young.)
674. *Larus franklini* Sw. & Rich. Franklin's Gull. (Downy young.)
675. *Larus philadelphiae* (Ord) Gray. Bonaparte's Gull. (Downy young.)
676. *Rhodostethia rosea* (Macgill.) Bruch. Ross's Gull. (Adult and downy young.)
677. *Xema sabinei* (J. Sabine) Leach. Sabine's Gull. (Downy young.)
- \* 678. *Creagrus furcatus* (Neb.) Bp. Swallow-tailed Gull.
680. *Sterna caspia* Pall. Caspian Tern. (Young in first plumage.)
681. *Sterna regia* Gamb. Royal Tern. (Young in first plumage and downy young.)
682. *Sterna elegans* Gamb. Elegant Tern. (Young in first plumage and downy young.)
683. *Sterna cantiaca aculeata* (Cabot) Ridgw. Cabot's Tern. (Downy young.)
684. *Sterna trudeaui* Aud. Trudeau's Tern. (All stages, but especially summer adult and young, all ages.)
688. *Sterna dougalli* Montag. Roseate Tern. (Downy young.)
689. *Sterna aleutica* Baird. Aleutian Tern. (Downy young.)
691. *Sterna fuliginosa* Guil. Sooty Tern. (Downy young.)
692. *Sterna anastheta* Scop. Bridled Tern. (Downy young.)
694. *Hydrochelidon leucoptera* (Weiss. & Schinz.) Boie. White-winged Black Tern. (Downy young; young in first plumage; winter adult.)

695. *Anous stolidus* Linn. Noddy Tern. (Downy young; young in first plumage.)
696. *Megalestris skua* (Brünn.) Ridgw. Skua Gull. (Downy young.)
697. *Stercorarius pomatorhinus* (Temm.) Vieill. Pomarine Jaeger. (Downy young.)
698. *Stercorarius crepidatus* (Banks) Vieill. Richardson's Jaeger. (Downy young.)
699. *Stercorarius parasiticus* (Linn.) Saunders. Long-tailed Jaeger. (Downy young and melanotic specimens of adult.)
703. *Phaebetria fuliginosa* (Gmel.) Bp. Sooty Albatros. (American specimens and downy young.)
704. *Ossifraga gigantea* (Gm.) Reich. Giant Fulmar. (American specimens and young in down.)
- 705a. *Fulmarus glacialis pacificus* (Aud.) Bp. Pacific Fulmar. (Young in down.)
706. *Priocella tenuirostris* (Aud.) Ridgw. Slender-billed Fulmar. (American specimens and downy young.)
- †707. *Priofinus melanurus* (Bonn.) Ridgw. Black-tailed Shearwater. (American specimens and downy young.)
- †708. *Puffinus kuhli* (Boie) Bp. Cinereous Shearwater. (American specimens and downy young.)
710. *Puffinus Creatopus* Cooper. Pink-footed Shearwater. (Downy young.)
- [711.] *Puffinus anglorum* Temm. Manx Shearwater. (American specimens and downy young.)
713. *Puffinus gavia* (Forst.) Finsch. Black-vented Shearwater. (Especially young in down.)
715. *Puffinus griseus* (Gm.) Finsch. Dark-bodied Shearwater. (Especially young in down.)
716. *Puffinus tenuirostris* Temm. Slender-billed Shearwater. (Series; young in down.)
- †717. *Æstrelata harsitata* (Temm.) Coues. Black-capped Petrel. (Series; young in down.)
- †718. *Æstrelata bulweri* (Jard. & Selby) Coues. Bulwer's Petrel. (Series, including downy young.)
720. *Halocyptena microsoma* Coues. Least Petrel. (Series, including downy young.)
724. *Cymochorea melana* (Bp.) Coues. Black Petrel. (Series, including downy young.)
725. *Cymochorea homochroa* Coues. Ashy Petrel. (Series, including downy young.)
- \*727. *Oceanodroma hornbyi* (Gray) Bp. Hornby's Petrel.
- †728. *Eregetta grallaria* (Vieill.) Bp. White-bellied Petrel.
730. *Æchmophorus clarki* (Lawr.) Coues. Clark's Grebe. (Downy young.)



731. *Podiceps holböllii* Reinh. American Red-necked Grebe. (Young in down.)
732. *Dytes auritus* (Linn.) Ridgw. Horned Grebe. (Young in down.)
- †733. *Dytes nigricollis* (Brehm.) Ridgw. Eared Grebe. (American specimens; young in down.)
736. *Colymbus torquatus* Brünn. Loon. (Downy young.)
737. *Colymbus adamsi* Gray. Great White-billed Loon. (Especially downy young.)
738. *Colymbus arcticus* Linn. Black-throated Diver. (Downy young.)
739. *Colymbus pacificus* Lawr. Pacific Diver. (Downy young.)
740. *Colymbus septentrionalis* Linn. Red-throated Diver. (Downy young.)
- †741. *Alca impennis* Linn. Great Auk.
742. *Uta mania torda* (Linn.) Leach. Razor-billed Auk. (Downy young.)
743. *Fratercula arctica* (Linn.) Steph. Common Puffin. (Downy young.)
- \*743a. *Fratercula arctica glacialis* (Leach) Ridgw. Large-billed Puffin.
746. *Ceratorhina monocerata* (Pall.) Cass. Horn-billed Puffin. (Downy young.)
747. *Phaleris psittacula* (Pall.) Temm. Parrot Auk. (Downy young, young in first plumage, and winter adults.)
748. *Simorhynchus cristatellus* (Pall.) Merrem. Crested Auk. (Downy young.)
749. *Simorhynchus pygmaeus* (Gmel.) Ridgw. Whiskered Auk. (Adults in breeding plumage and in winter; downy young.)
751. *Ptycorhamphus alcuticus* (Pall.) Bonap. Cassin's Auk. (Downy young.)
752. *Alle nigricans* Link. Sea Dove; Dovekie. (Downy young.)
753. *Synthliborhamphus antiquus* (Gm.) Coes. Black-throated Guillemot. (Downy young.)
754. *Synthliborhamphus urmizusume* (Temm.) Coes. Temminck's Guillemot. (Series, all stages.)
755. *Brachyrhamphus marmoratus* (Gm.) Brandt. Marbled Guillemot. (Downy young.)
756. *Brachyrhamphus kittlitzii* Brandt. Kittlitz's Guillemot. (Series, all stages, but especially downy young.)
757. *Brachyrhamphus hypoleucus* Xantus. Xantus's Guillemot. (Summer adults and downy young.)
758. *Brachyrhamphus craveri* (Salvad.) Coes. Craver's Guillemot. (Summer adults and downy young.)
- \*759. *Brachyrhamphus brachypterus* Brandt. Short-winged Guillemot.
- \*762. *Uria carbo* (Pall.) Gray. Sooty Guillemot.



**ON SEMPER'S METHOD OF MAKING DRY PREPARATIONS.\***

In the Journal of the Royal Microscopical Society of London for August last it is stated that "Herr Semper recently exhibited to the Würzburg Society some zoölogical and anatomical preparations which had been prepared by a new method for dry preservation. After being hardened in a solution of chromic acid [the strength to be regulated according to the delicacy of the object and varying from one-half to one per cent.], the objects are placed in alcohol [95 per cent. will answer] to remove the water and afterwards steeped in oil of turpentine and finally dried. The tissues, while drying, are permeated by innumerable small air-bubbles, and in consequence the preparations retain their original form without sensibly shrinking, while in color they assume a white tint similar to a gypsum model. The finished preparation, which is almost pure white, and which possesses a firm, leathery consistency, may be painted with colors in parts as may be required for teaching purposes. The preparations produced were partly complete animals—mussels, annelida, and so forth—with the viscera of various vertebrate and invertebrate animals. A preparation of a cat's eye showed that, after drying, the position of the parts—the lens, ciliary processes, and so forth—underwent no change. A microscopical preparation of brain, treated on this method, proved that still simpler microscopic relations were retained after the drying—and, particularly with carmine coloring, could be distinctly recognized.

Herr v. Kölliker pointed out the advantage to be derived from this method, especially the possibility of adapting the preparations for special demonstration by painting.†

The utility of a method of preparation of this kind for moderately-sized animals, usually treated as alcoholics, will at once be apparent. It would be possible to paint the subject either in the natural colors of life, or, in the case of anatomical preparations, to indicate the parts by the use of arbitrary, conventional tints. While these preparations would be readily combustible, they would be light and absolutely free from the attacks of *Dermestes*, those well-known museum pests. As a most instructive method of making dry preparations for museum display, either of whole animals or of their anatomy, it certainly deserves a trial, as it is a much neater and cleaner method than the Wickersheimer plan, in which glycerine enters as an important element, and which would be objectionable because the object could never be thoroughly dried, but would always be sticky and disagreeable to handle and liable to soil the shelves of the museum cases. In order to make the preservation effectual, after dehydration in 95 per cent. alcohol, which is strong enough

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\* Abstract, with remarks by J. A. Ryder.

† Verhandl. Phys.-Med. Gesell., Würzburg, XV, 1881, S. B. IX.

for the purpose, the preparation ought to be allowed to become thoroughly saturated with the oil of turpentine; the time which it will take to do this will of course depend upon the size and thickness of the object treated. The principle involved in this method is the same as that applied in making balsam or damar preparations on slips for the microscope, only that after dehydration is effected oil of cloves is used to make the object transparent instead of turpentine, although the latter is also used. The preparation is then covered with a drop of balsam and the cover-glass put on, when you have a specimen that, with a little care, will last a lifetime. The Semper is simply the microscopic method adapted to large objects which could not be mounted upon slides, and I see no reason why they should not be equally as durable as microscopical balsam preparations. It is equally important that the strong alcohol should completely saturate the specimen, else the turpentine will not find its way into all parts of it so as to render it indestructible when dry. Two or three hours would probably suffice for the saturation with alcohol or turpentine of moderately large specimens. The hardening in the chromic acid solution would require from 12 to 24 hours, according to the size of the object. This method is also free from the objection which applies to Wickersheimer's, that there are no corrosive metallic poisons used.

By placing the vessel containing the preparation as immersed under an air pump, the penetration of the liquids will be facilitated.

**NOTES ON A COLLECTION OF FISHES, MADE BY LIEUT. HENRY E. NICHOLS, U. S. N., ON THE WEST COAST OF MEXICO, WITH DESCRIPTIONS OF NEW SPECIES.**

**By DAVID S. JORDAN and CHARLES H. GILBERT.**

During the autumn of 1880 a cruise along the west coast of Mexico and Central America was made by the U. S. Coast and Geodetic steamer Hassler. Lient. Henry E. Nichols, the officer in command, took much pains to make collections of fishes whenever they were obtainable. As a result of his labors we have the small but extremely valuable collection noticed in the present paper. It will be observed that twelve of the specimens came from the Revillagigedo Islands, in the open sea to the westward of Mexico, a locality where no collections of fishes had been previously made by any one. Six of these specimens belong to species new to the fauna of North America.

We give an enumeration by localities of the species in the entire collection, with the number borne by each specimen on the records of the United States National Museum.

*A.—Whaler's Bay, Guadalupe Island, Lower California.*

1. PSEUDOJULIS MODESTUS (Girard) Gthr.
2. PSEUDOJULIS MODESTUS (Grd.) Gthr. (No. 28,391 U. S. Nat. Mus.)

B.—*Sulphur Bay, Clarion Island.*3. *CARANX ORTHOGRAMMUS* sp. nov. (No. 28,345 U. S. Nat. Mus.)

Allied to *Caranx ferdau* and *C. gymnostethoides*; species with nearly straight lateral line, many-rayed dorsal and anal, and feeble teeth.

Body elliptical, compressed, the back regularly but not strongly arched, the ventral outline forming a rather even but less convex curve. Head longer than deep, rather pointed in profile, its median ridge somewhat elevated. Mouth low, oblique, the maxillary extending to nearly opposite front of pupil, its length  $2\frac{1}{3}$  in head; lower jaw slightly projecting.

Teeth all equally minute, in villiform bands on jaws, vomer, palatines, and tongue. Eye large, broader than preorbital, its diameter  $1\frac{1}{2}$  in length of snout,  $4\frac{2}{3}$  in head. Adipose eyelid little developed. Cheeks and temporal region with fine scales; rest of head naked.

Scales rather small, those below pectorals smaller; a naked area on breast, becoming wider forwards from base of ventrals. Lateral line almost straight, slightly undulated and curved upwards above pectorals, becoming straight by almost imperceptible degrees opposite lobe of anal. Greatest depth of the arch less than diameter of pupil; the length of straight part less than that of the curve. Plates developed only on the posterior third of the straight part; the plates small, with low keels, their spines little prominent; 15 to 18 plates developed, including small ones, in front of which are about 40 ordinary scales on the straight portion of the lateral line.

Spinous dorsal very small, of three weak spines slightly connected by membrane, the highest spine not longer than diameter of pupil (these spines, probably, more numerous and larger in young examples) Soft dorsal long and low, with slender rays; a well-developed scaly basal sheath anteriorly. Elevated rays in front a little more than one-third the base of the fin, a little more than half length of head; anal shorter than dorsal, its anterior lobe equally high, and with a similar basal sheath. Free anal spines obsolete in typical specimen. Caudal lobes moderate, equal, as long as head, their length equal to the depth of the fin from tip to tip. Pectoral fin falcate, its tip very slender, reaching eighth ray of anal, its length  $2\frac{1}{2}$  in body. Ventrals short,  $2\frac{1}{2}$  in head.

Head  $2\frac{3}{4}$  in length to base of caudal; depth  $3\frac{3}{4}$ .

Fin rays: D. III–I, 32. A. II–I, 26.

Coloration in spirits, smutty olivaceous, everywhere irregularly clouded with darker, the belly scarcely paler than the back; opercular spot obsolete. Dorsal, anal, posterior border of caudal, and tips of ventrals blackish; fins otherwise dull olivaceous.

A single specimen of this species, 16 inches in length, was obtained by Lieutenant Nichols, at Sulphur Bay, Clarion Island, off the west coast of Mexico.

It is certainly very close to *Caranx ferdau* (Günther, Fische Sudsee,

ii, 134, taf. 87, 88), but it seems to differ in color and in the armature of the lateral line.

4. *CARANX LUGUBRIS*\* Poey. (No. 28,375 U. S. Nat. Mus.)

Body oblong-ovate, compressed, deep, the back elevated, but not arched. Profile gibbous from the occiput forward to above eye, thence straight and steep at a considerable angle to a point in front of nostrils, whence the snout again projects at a strong angle. Outline of back nearly straight from the occiput to the front of the second dorsal, thence declining regularly to the caudal peduncle. Ventral outline nearly straight from the lower jaw to the origin of the anal, the base of which is placed at a similar angle to that of the soft dorsal.

Head large, very deep, deeper than long; occipital ridge not sharp. Mouth large, the broad maxillary reaching to opposite front of pupil. Lower jaw strong, the chin projecting when the mouth is closed. Teeth in the upper jaw in a narrow villiform band, with an outer series of larger, conical teeth, six to eight in number on each side, subequal and regularly arranged. Lower jaw with a single series of teeth similar to the larger teeth of the upper jaw, a few smaller teeth intermixed with them. No differentiated canine teeth. Villiform teeth on vomer, palatines, and tongue. Gill-rakers rather long, close-set, three-fifths diameter of eye. Eye large, with a distinct adipose eyelid, its diameter equal to that of the broad preorbital, which is wider than the maxillary,  $4\frac{1}{2}$  times in length of head.

Cheeks closely scaled; opercles mostly naked below; a few scales on subopercle and interopercle. Scales on body not very small; breast closely scaled. Lateral line with a moderate curve anteriorly, becoming straight at front of anal; the length of the arch being less than two-thirds that of the straight part; greatest depth of the arch about one-fifth its length. Armature of lateral line beginning at the curve; the plates rather large, very broad, twenty-eight in number. Fins with very few scales or none.

Spinous dorsal moderate, the spines rather strong, its last spine stout and free, nearly horizontal. Second dorsal falcate, the longest rays more than half the length of its base. Posterior part of the fin rather low, rising well above its low basal sheath of scales which terminates near the middle of the fin; anal similar to soft dorsal, its anterior rays more than half the base of the fin. Free anal spines moderate. Caudal lobes rather broad, equal, not very long, the upper as long as from snout to edge of opercle; depth of the fin from tip to tip, about equal to depth of head. Ventral fins short, not filamentous, as long as from snout to end of maxillary. Pectoral extremely long, falcate, reaching to the tenth plate of the lateral line, or about to seventh anal ray, its length  $2\frac{3}{4}$  in that of body, less than the greatest depth of the body.

Fin rays: D. VII-I, 21. A. II-I, 18.

\* *Caranx ascensionis* Günther, *Fische der Sudsee* ii, 132, taf. 85 = *Caranx ascensionis* Cuv. & Val. ix, 102: evidently not *Scomber ascensionis* Osbeck, which is pale in color, and with D. VIII-25; A. 25.



Head  $3\frac{1}{2}$  in length to base of caudal; greatest depth  $2\frac{2}{3}$ .

Color sooty blackish, nearly uniform, the belly not paler than the back. A black spot at angle of opercle, none on pectoral. Ventrals, anal and dorsal wholly black, as are the shields of the lateral line.

The single specimen of this species (No. 28,385) 18 inches in length, was obtained by Lieutenant Nichols, at Sulphur Bay, Clarion Island, off the west coast of Mexico. It seems to be identical with the fish figured by Dr. Günther (Fische Sudsee, taf. 85) as *Caranx ascensionis*, from Kingsmill Island, but the original *Scomber ascensionis* of Osbeck is evidently a different species.

5. *BALISTES MENTO* sp. nov. (No. 28,387 U. S. Nat. Mus.)

Body oblong, elliptical, slightly heaviest forward; dorsal and ventral outlines similar, neither much arched. Body not strongly compressed, its greatest thickness a little less than half its greatest depth. Mouth very small, terminal, higher up than usual, nearly in the line of the axis of the body, the chin protruding beyond it; width of the mouth from angle to angle about equal to the diameter of the eye. Lower jaw the longer, its teeth slightly directed backward; upper jaw with its teeth directed slightly forwards, shutting outside of the lower teeth. Teeth pale brownish, somewhat unequal; lower teeth wedge shaped, broadest and nearly truncate at tip; teeth of the upper jaw obliquely truncate, slightly emarginate, the outer angle pointed and projecting. About eight teeth in the outer row; the mouth so closely shut that the inner row cannot be seen.

Eye small, high and well back, its diameter contained nearly twice in the interorbital width, 3 in snout. A groove in front of eye below the nostrils, about as long as the diameter of the eye. Five narrow grooves on the cheek below the eye, extending from near the mouth backward toward the base of the pectoral.

Height of gill-opening slightly greater than diameter of eye, its lower edge opposite middle of pectoral.

Scales of body comparatively small, not very rough. Scales of belly somewhat reduced in size, arranged in oblique series running downward and backward from the pectoral region, these forming a contrast in direction with the scales of the sides. Scales on caudal peduncle without keel or spines, similar to those on rest of body; scales on posterior portion of sides slightly carinate, forming low ridges along the rows of scales. Gill-opening surrounded by small scales and without larger plates.

First dorsal spine very robust, placed somewhat behind eye, its height a little more than twice diameter of eye, the deep dorsal groove as long as the spine. Second spine short and slender, its length about equal to diameter of eye. *Third dorsal spine wholly wanting.*

Soft dorsal rather high, its longest rays more than half the length of the base of the fin,  $1\frac{2}{3}$  in head; anal similar, its base a little shorter, a few series of small scales covering the base of each fin; caudal moderate, lunate, its depth from tip to tip more than its length, and  $1\frac{1}{4}$  times



in length of head. Caudal peduncle subterete, deeper than broad. Ventral spine slightly movable. Pectoral short, rounded, less than half length of head.

Head  $3\frac{1}{2}$  in length; depth  $2\frac{2}{5}$ .

Dorsal rays II-I, 29. Anal I, 26.

Lat. l. 37; 23 scales in an oblique series upward and forward from front of anal.

Coloration in spirits, dark olive above, rather pale below, the skin between the scales somewhat darker; scaly basal part of dorsal and anal abruptly black; membrane of these fins yellowish, the tips dusky. Scaly base of caudal dark brown, the medial part lighter brownish; a lunate band at tip yellowish; pectorals olivaceous.

One specimen of this species,  $10\frac{1}{2}$  inches long, was taken by Lieutenant Nichols at Clarion Island. It differs from all the known species of *Balistes* in the presence of but two spines in the dorsal. If this be not an accidental variation, the species should probably be taken as the type of a distinct genus. The small high mouth gives a somewhat peculiar physiognomy.

C.—*Braithwaite Bay, Socorro Island. (Taken with hook.)*

6. *EPINEPHELUS SELLICAUDA* Gill. (28,213.)

7. *EPINEPHELUS SELLICAUDA* Gill. (28,237.)

8. *DERMATOLEPIS PUNCTATUS* Gill. (28,214.)

9. *DERMATOLEPIS PUNCTATUS* Gill. (28,223.)

10. *PIMELEPTERUS LUTESCENS* sp. nov. (No. 28,371, U. S. N. M.)

Body oblong-elliptical, robust; the dorsal and ventral outlines moderately and nearly equally arched. Head bluntish; the profile evenly curved, without depression in front of the eye; the preorbital region less gibbous than in *P. bosci*. Mouth terminal, the lower jaw slightly the shorter, the broad maxillary reaching to opposite the front of the eye, its width about equal to that of the preorbital.

Teeth in both jaws broad, rounded or subtruncate, in single rows, the horizontal roots longer than the crown, but not twice as long; about 36 teeth in each jaw. Behind the large teeth in each jaw is a band of rasp-like asperities. Gill-rakers short.

Preopercle with its angle rounded and membranaceous, the vertical limb straight and minutely serrulate. Cheeks with four rows of large scales, besides several series of smaller ones. Preorbital, jaws, snout, rim of eye, and rounded part of preopercle naked; the head otherwise closely scaly.

Scales on body rather small, firm, smoothish; those on breast smaller; fins, as usually, with the soft parts covered with small scales.

Dorsal spines rather high and strong, the middle ones highest, higher than the soft rays, nearly twice the height of the last spine, and half the length of the head,  $3\frac{2}{5}$  in greatest depth of body. Soft dorsal rather high, not at all falcate, the first rays two-fifths the length of the head.

Anal fin similar, shorter and higher, the spines graduated, the longest rays more than half length of head.

Caudal wide, moderately forked, the lobes equal, the longest a little longer than head; the depth of the fin, from tip to tip, about equal to greatest depth of body. Pectorals short, slightly longer than ventrals; as long as from snout to edge of preopercle. Ventrals placed well behind pectorals, not reaching vent.

Head  $3\frac{3}{4}$  in length; depth  $2\frac{1}{4}$ .

Dorsal rays, XI, 11; Anal, III, 11. Scales, 12-67-22.

Coloration in spirits nearly uniform light grayish, without distinct markings; golden yellow in life, according to Lieutenant Nichols; very faint darker streaks present along the rows of scales. Preorbital, sub-orbital, and preopercle bright silvery; lower jaw silvery; both jaws dusky at tip. Fins all pale. A very obscure darker blotch in front of base of pectoral.

One specimen, about 15 inches in length, taken by Lieutenant Nichols at Braithwaite Bay, Socorro Island. It differs from *P. bosci*, in form, in color, and in the greater development of nearly all the fins.

11. *CARANX MELAMPYGUS* Cuv. & Val. (No. 28,355 U. S. N. M.)

Body oblong-ovate, compressed, the back arched, the profile not steep, the curve from snout to dorsal being a nearly regular arc; ventral outline nearly straight from the chin to front of anal, where an angle is formed with the ascending base of the anal.

Head moderate, compressed, not blunt in profile, the occiput and inter-orbital region elevated and considerably carinated. Mouth moderate, low, oblique, the lower jaw prominent, scarcely projecting beyond upper; maxillary barely reaching to opposite the front of the small eye. Upper jaw with a band of villiform teeth, in front of which is a row of strong teeth, about ten on each side, the anterior largest, larger than in most species, but hardly canines. Lower jaw with a single row of rather large teeth, irregularly placed, much smaller than the larger teeth of the upper jaw; villiform teeth on vomer, palatines, and tongue. Eye small, placed high and far back; adipose eyelid small. Diameter of eye 2 in length of snout,  $1\frac{1}{4}$  in the depth of the broad preorbital,  $2\frac{1}{2}$  in the post-orbital part of head, and 2 in interorbital area. Checks and upper part of opercles with small scales; rest of head naked. Gill-rakers long and strong, as long as eye.

Scales rather small; breast closely scaled; lateral line not strongly arched, becoming straight opposite front of anal, its curved part  $1\frac{2}{3}$  in length of straight part. Plates on anterior portion of straight part scarcely different from ordinary scales; those on posterior portion moderate, with high keels and appressed spines; 37 plates in all, counting from beginning of straight part.

Spinous dorsal moderate, the spines slender, rather high. Procumbent dorsal spine obsolete. Soft dorsal low, falcate in front, the longest ray little more than half the base of the fin, or  $1\frac{1}{2}$  in length of head.

Anterior part of the fin with a distinct scaly basal sheath, which becomes obsolete at about the 14th ray. Anal fin similar to soft dorsal, a little shorter and lower, its scaly sheath more developed; free anal spines moderate. Caudal fin widely forked, its lobes subequal,  $1\frac{1}{3}$  in head; distance from tip to tip more than the length of either lobe. Pectorals long and falcate, their tips reaching sixth anal ray, longer than head, and a trifle less than greatest depth of body. Ventrals short, one-third length of pectorals.

Coloration in spirits olivaceous; dark above; pale below, but nowhere silvery; top of head clear olivaceous; opercular spot obsolete; lower jaw soiled golden; no pectoral spot; base of pectoral somewhat dusky; small irregular dark brown spots, smaller than the pupil and irregular in size, scattered without order over the body, rather most numerous about the pectorals. Caudal fin dusky, especially on its posterior edge; dorsal and anal dusky, their lobes black; ventrals dusky at tip; pectorals olivaceous.

Head  $3\frac{1}{2}$  in length (without caudal); greatest depth,  $2\frac{3}{4}$ ; pectoral,  $2\frac{4}{5}$ ; length of type, 20 inches.

Fin rays: D. VIII-I, 22. A., II-I, 19.

A single example of this species was taken by Lieutenant Nichols, with a hook, in Braithwaite Bay, Socorro Island, off the west coast of Mexico. It agrees very closely with the description and figure of *Caranx melampygus* given by Günther (Fische Sudsee ii, 133, taf. 86.)

12. *PLATYGLOSSUS NICHOLSI* sp. nov. (No. 28,218 U. S. N. M.)

A species of the ordinary type, without sharp markings of any kind. Body rather deep; the profile steep, evenly curved; the snout moderately pointed. Teeth strong, the posterior canines especially so. Head entirely naked; scales on breast not much reduced. Dorsal spines very slender, flexible. Pectoral fin  $1\frac{3}{5}$  in length of head, reaching as far as the slender tips of the ventrals. Caudal fin rounded, its angles not at all produced.

Coloration in spirits, plain olivaceous above, sides brownish, belly paler; an obscure dusky bar across middle of spinous dorsal and extending down the sides; some of the scales of back with dark lines. Soft dorsal and anal fins with not very numerous small, round dark spots, especially posteriorly; otherwise plain; spinous dorsal dusky. The coloration may have been bright in life, but there could never have been any sharp markings.

Head  $3\frac{1}{2}$  in length; depth  $3\frac{1}{2}$ .

D. IX, 12. A. III, 11. Scales 2-28-8.

This species is known to us from a single example,  $10\frac{1}{2}$  inches long, taken by Lieutenant Nichols at Braithwaite Bay, Socorro Island. It is readily distinguished from the only two members of the genus thus far discovered on the western coast of tropical America, *P. dispilus* Günther, and *P. semicinctus* (Ayres). It is impossible, from descriptions alone, to compare it satisfactorily with the numerous West Indian

and East Indian species of the genus, but, as all are local in their range, ours is probably a species different from any of them.

D.—*San Blas, Mexico.*

13. POMADASYS FURTHI (Steindachner.) J. & G. (28,225.)
14. LUTJANUS PRIETO Jor. & Gilb. (Mss.). (28,253.)
15. CENTROPOMUS PEDIMACULA Poey.
16. GERRES AXILLARIS Gthr. (28,255.)

E.—*Acapuleo, Mexico.*

17. EPINEPHELUS ANALOGUS Gill. (28,235.)
18. POMADASYS LEUCISCUS (Gthr.) J. & G. (28,257.)
19. LUTJANUS CAXIS (Bloch.) Poey. (28,254.)
20. CYNOSCIION RETICULATUM (Günther) J. & G. (28,250.)

F.—*Porto Escondido, Mexico.*

21. PIMELEPTERUS ANALOGUS Gill. (28,270.)

This species is closely related to *P. bosei* Lac., differing in the larger scales and greater depth of the body.

22. CARANX CABALLUS Gthr.
23. TRACHYNOTUS FASCIATUS Gill.
24. MUGIL BRASILIENSIS Ag. (28,244.)

G.—*Salina Cruz, Mexico.*

25. CENTROPOMUS ROBALITO Jor. & Gilb. (Mss.) (28,245.)
26. GERRES RHOMBEUS C. & V.
27. DORMITATOR MACULATUS (Bloch) Gill.
28. PHILYPNUS LATERALIS Gill. (28,252.)
29. PHILYPNUS LATERALIS Gill. (28,269.)
30. CHANOS SALMONEUS (Forst.) C. & V. (28,240.)

H.—*La Union, San Salvador.*

31. CYNOSCIION SQUAMIPINNE (Günther) Streets. (28,260.)
32. SCLENA ALUTA\* sp. nov. (No. 28,129 U. S. N. M.)

Allied to *Sciæna chrysolenca* (Günther).

Form rather elongate, the back a little elevated and compressed; caudal peduncle especially long and slender. Head rather broad above the eyes, somewhat depressed, so that the anterior profile is a little concave, in front of which the snout is rather abruptly truncate. Interorbital space a little broader than the large eye, the diameter of which is about equal to the length of the snout, and contained about four times in the length of the head: Width of preorbital two-fifths the diameter of the eye. Preopercle strongly serrated, the three lowest serræ radi-

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\**αλουτος*, unwashed.

ating, the lowest and largest one turned downward and forward. Lower jaw included, considerably shorter than upper. Snout scarcely projecting beyond premaxillaries. Mouth nearly horizontal; premaxillary much below the level of the eye; maxillary extending to just beyond middle of eye. Teeth in both jaws in narrow villiform bands, the outer teeth in the upper jaw somewhat enlarged; those in the lower jaw all small. Sides and top of head somewhat cavernous, the surface yielding to the touch. Gill-rakers shortish, rather slender, about as long as pupil. Pseudobranchiae large.

Dorsal fin divided nearly to base, the spines not very high, rather flexible, the longest little more than half length of head; second spine a little stouter than third, and nearly as high. Second dorsal rather low. Second anal spine strong, about half length of head, three-fourths height of the soft rays; distance from front of anal to caudal  $1\frac{3}{4}$  in length of body; distance from vent to anal a little more than half length of second anal spine. Caudal fin long, double truncate, the middle rays produced, as long as from snout to edge of preopercle; caudal peduncle (from end of anal)  $1\frac{1}{2}$  in head; anal ending in advance of end of dorsal, its first spine in advance of middle of soft dorsal. Ventrals long, the second ray filamentous, reaching vent. Pectorals rather short, as long as caudal.

Scales large, those on breast not much smaller. Soft parts of vertical fins scaly toward the base.

Lower pharyngeals narrow, with small, slender, pointed teeth, those of the series on the inner edge of the bone much enlarged, also very slender.

Head  $3\frac{2}{5}$  in length to base of caudal; greatest depth,  $3\frac{1}{4}$ .

D. X-I, 18. A. II, 8. Lat. l., 44; 5 scales in a vertical series from front of dorsal to lateral lines.

Color light reddish brown, dingy with dark punctulations. Ground color a light coppery shade, little silvery; each scale with many dark points and a smutty edging; the general hue the same above and below; no distinct markings. Preorbital of a soiled silvery. Fins similarly dusky, the caudal yellowish, the anal almost black. Inside of opercle dusky.

This species is known to us from one specimen,  $7\frac{1}{2}$  inches in length, numbered 28,129 on the National Museum Register. It was collected at La Union, on the Gulf of Fonseca, in San Salvador, by Lieut H. E. Nichols.

33. MUGIL BRASILIENSIS Ag. (29,644.)

34. *ÆLURICHTHYS PANAMENSIS* Gthr. (28,192.)

INDIANA UNIVERSITY, November 5, 1881.



**REPORT ON THE CONTENTS OF TWO BOTTLES OF WATER FROM  
THE GULF OF MEXICO, FORWARDED BY THE SMITHSONIAN  
INSTITUTION.\***

**By DR. W. G. FARLOW.**

When received in Cambridge, May 14, 1881, the water of both bottles gave out an excessively disagreeable odor of putrefying organic matter, and ammonia was given off in considerable quantities, as was shown by holding a rod moistened with hydrochloric acid over the mouths of the bottles. In one bottle there was a greenish-colored, slimy deposit an inch deep, and the water above was clear. In the second bottle the water was turbid throughout and of rather a brownish color.

The microscopic examinations showed that the contents of the two bottles were alike. The greater portion of the matter contained in the water consisted of a mass of amorphous slime, in which were numerous crystals, apparently of a fatty nature. There were, besides, a large quantity of eggs of some animal, which were easily recognized, although partially decomposed, and the remains of small crustacea. In addition to the animal substances mentioned were remains of plant tissues, leaves and young stems, pine pollen, and diatoms of four or five different species.

From what has been said, it is evident that the slime in the water must have been at some time not far from the land, or else that the bottles used, or the water after it had been collected, must have been exposed to the air for some time.

It is my opinion that the trouble is not caused by the presence of any vegetable substance, but that the presence of the latter is accidental. The slimy mass probably originated from a mass of eggs which, for some reason or other, were killed near the surface of the water, and the smaller crustaceans in the neighborhood have been involved in the general mass of slime.

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**REMAINS OF THE WALRUS (?) IN MAINE.**

**By C. H. BOYD.**

ADDISON POINT, WASHINGTON COUNTY, MAINE,

*October 8, 1881.*

DEAR SIR: I have the honor to make the following statement of finding the partly fossilized bones of a walrus (?), in expectation that it may possibly prove of interest in connection with investigations of the Smithsonian, as tending to show the range of the walrus thus far south, or that this climate was more Arctic in time past.

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\* This water was collected where the fish mortality, referred to in preceding pages, was the greatest.

Yesterday, hearing that the bones of a large animal were washing out of a clay bank at Reef Point, on the eastern side of the Pleasant River, 3 miles below this village, I visited the spot to see some of the remains *in situ*. I then dug out several pieces of rib and a forearm.

The Point, which is in cultivation, is 15 feet above high water, and has been washing away for many years. Mr. Oliver Look, the owner of the property, informs me that it has washed off 100 feet within the last sixty years. He also showed me a tusk with a portion of the socket attached, which he dug out here a few days since, and from which I judge the remains to be those of a walrus. I inclose a rough sketch and also a small piece of scale from the tusk that came off in my hand while making the sketch. These bones are in stiff blue clay about 2 feet above high water in a nearly vertical bank, there being 6 feet of the clay above them and above that some 6 feet of gravel and soil.

Nearly opposite, on the west side of the bay, I found a kitchen midden, now covered with a growth of hard wood. From it I obtained, by digging, three pieces of chipped flint and a bear's tooth.

The exact location of both these "finds" can be obtained, if desired, from our topographical sheet now in progress, by application to Professor Hilgard, assistant in charge of the Coast and Geodetic Survey.

Very respectfully, your obedient servant,

C. H. BOYD,  
*Assistant, C. and G. Survey.*

Prof. SPENCER F. BAIRD,  
*Secretary Smithsonian Institution.*

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#### **DIRECTIONS FOR COLLECTING AND PRESERVING FISH.**

**By TARLETON H. BEAN.**

1 Wash the fish thoroughly in water, to remove the slime and dirt that are almost invariably present upon them, not omitting the inside of the mouth and the gills. In cleansing fish that have a tough, scaleless skin, or such as have the scales firmly fixed, use a stiff paint brush or a scrubbing brush; for thin-skinned fish and such as have deciduous scales, a softer brush must be taken. Some fish are covered plentifully with tenacious mucus that is with great difficulty removed by water alone; in such cases a solution of two tablespoonfuls of alum in a pint of lukewarm water will be found efficacious.

2. It is often necessary to preserve fish that are stale, or partially digested, and offensive to the smell. Such examples may be thoroughly disinfected by the use of the disinfecting solution of chloride of soda. Use a tablespoonful of the solution in one pint of water. With this wash the gills, and pour it into the mouth and stomach, allowing it to return by the mouth.

3. Inject alcohol in the mouth and the vent, to preserve the viscera. Make small incisions in the belly and in thick parts of the body, to allow the alcohol to penetrate the tissues. It is nearly always desirable to remove the liver, stomach, and intestines from large fish, and to preserve these separately, numbering them so as to correspond with the fish from which they are taken.

4. It is a good plan to keep freshly collected fishes in weak alcohol for a day or two; a mixture of two parts of 95 per cent. alcohol to one of water will answer for this temporary immersion. Some species are exceedingly soft and flabby, falling to the bottom of a glass jar or other receptacle, becoming partly imbedded in their own mucus, and rapidly disintegrating in consequence. Such specimens should either be suspended in the alcohol by a thread or string from the neck of the jar or the hook sometimes found on the inside of the stopple, or a bed of excelsior or muslin should raise them from the bottom; these are necessary precautions which will prevent many losses. After the fish have been kept for not more than two days in the weak alcohol, transfer them to a mixture of three parts of 95 per cent. alcohol to one of water. Ordinarily this latter will preserve specimens that are not crowded too much at least three months; some, of course, will remain in good condition still longer; but, generally, three months will reduce the preservative power of the liquid so far as to make a renewal of alcohol necessary. The tendency with many collectors is to overcrowd specimens, and, as a result, museums frequently receive a lot of half-rotten material which is too valuable to be thrown away and is yet always a source of trouble and disappointment. A jar, tank, or case of any kind should never be expected to accommodate more than half its own bulk of fish, and even this proportion will require watchfulness to avoid loss. If a collection freshly caught is to be shipped to a distant museum or private collection, observe the directions about cleansing the fish and preserving the viscera separately if needful, and then use nothing weaker than a mixture containing three parts of 95 per cent. alcohol and one part of water. A good mixture which will carry fish in very nice condition is the following: 95 per cent. (or absolute) alcohol, 3 quarts; water, 1 quart; glycerine, 1 pint; borax, 1 ounce. There is nothing better, however, than the mixture of three parts of alcohol and one of water.

5. The extensive collections of the United States Fish Commission are usually packed in copper tanks, which are tin-lined within. The lid of the tank is made to screw in the top and its diameter is always as great as the dimensions of the top will allow. The tanks (called Agassiz tanks) are made to contain 4, 8, or 16 gallons. Strong chests, of a size large enough to accommodate a 16-gallon tank, are used for shipping; the hinges and hasps of these chests are riveted on; handles are screwed on at the sides, and each chest is furnished with a strong lock. The chest may contain one 16-gallon tank, or two of 8 gallons, or four of 4 gallons, or one of 8 gallons and two of 4 gallons, as may best

suit the convenience of the collector. When several tanks make up the complement it is usual to separate them by thin wooden partitions.

Cases made of ordinary tinned sheet-iron are much more generally used than the expensive copper cans, and they will answer well enough if the joints are perfectly tight and the top is securely soldered on.

Oak kegs, holding about 10 gallons each and provided with iron hoops, are capital containers for large fishes, and they will stand the wear and tear of railway travel better than most other receptacles.

Glass preserving-jars may be shipped long distances with comparative safety, but they must be tested, by inverting them, to insure tightness; the top of the jar and the rubber band should be wiped dry; wrap the jars in strong paper and pack them in some material that will prevent breakage.

When corked bottles are used, tie a piece of bladder securely over the cork. Where seals and sea-lions occur, the throat, as prepared by the Alents for example, will be found an excellent covering. It is necessary to wet the membrane to make it pliable. Whenever jars, bottles, or any other small containers are filled with fish which are not provided with tin tags, write plainly with a lead-pencil on heavy manila or writing-paper the name of the place where the fish were taken, the date of capture, and the name of the collector. Put a label of this kind inside of each bottle; it will remain legible for years.

6. Each specimen should be provided with a numbered tin tag, which is to be fastened, whenever possible, by means of a string passed through the right gill-opening and out at the mouth. When the string *must* be tied around the body or tail of the fish it should be fixed securely and yet without injuring any of the fins. A catalogue is to be kept by the collector, in which the numbers corresponding with those on the tags must be entered, with notes as to place, time, and mode of capture, and other particulars which will be more fully mentioned further on. Wrap each fish separately in common coarse muslin (the coarser the better), and tie the ends securely. Do not tie the string so tightly around the body of the fish as to make furrows and wrinkles in the skin. If tin tags are not at hand, a label written firmly on stout paper with a lead-pencil should be wrapped inside of the covering of the fish. It is necessary always to fill the receptacle in which specimens are packed—a bottle or jar may be either filled with alcohol or the specimens may be wrapped in muslin. It is not a good plan to put tow, excelsior, or cotton-wool on top of fish, as it presses them close together and prevents the free circulation of alcohol between them. For long journeys it is desirable to secure better protection than the muslin wrapping alone affords. This may be gained by placing beds of excelsior or thin wood shavings between the layers of fish and at the bottom and top of the case.

A plainly-written card placed at the top of the box, so as to be seen when the lid is removed, telling its contents and by whom it was sent, will save much trouble when the collection is to be unpacked.



7. Notes of color, taken from the fresh specimens, should be sent with them if the fish are to be described in the museum. The collector should also preserve in his own books a record of life-colors under the catalogue numbers corresponding with the tin tags fastened on his fish. He can then obtain the identification of his species by their numbers and publish his studies upon them at his own pleasure.

8. Local names of fish should always accompany the specimens when obtainable.

9. It is desirable to know whether or not the species is abundant; whether different sizes of the same fish are found; whether they associate in schools or not; whether they are permanent residents or migratory; if migratory, by what routes they come and go; whether they form an important article of food; what they feed upon and what species prey upon them; the depth and character of the bottom on which they occur; the mode of capturing them; the uses made of them and the various products which they go to form, in short, everything bearing upon the life history or the economic applications of the species should be noted in detail.

10. Before washing the fish look them over for external parasites; examine the gills and the inside of the mouth carefully, as these are favorite situations. These parasites often furnish a clue to the migrations of the fish; remove them if they can be taken off entire, if not, let them remain, and call attention to their presence in your shipping notes. Preserve the parasites in vials or bottles, and provide them with labels stating from what fish they came and in what situation they were found.

To preserve fish indefinitely in glass jars, observe the following directions: first, select a jar of the proper size to accommodate the specimen amply, without bending or distorting it in any way; put in the fish with the tail down in nearly all cases; the tail may often rest upon the bottom of the jar, or the fish may be suspended from the hook which is now found in the stopple of the modern museum jars; cover the fish completely with the alcoholic mixture referred to in the closing sentence of paragraph 4; discoloration of the alcohol is a sign that its preservative power is weakened and calls for a renewal; fishes in alcohol will never make a good show unless the liquid is kept clear and clean. A label giving the name of the fish, place of its capture, and name of its captor, should be tied on the neck of the jar by means of a piece of narrow tape passed through holes punched in the ends of the paper. The jars must have accurately ground glass stopples. It is best to use no kind of sealing wax to coat the joint of the stopple; simply wipe the glass perfectly dry, close the jar properly, and there will be little danger of evaporation. Do not let the direct sunlight strike your jars, and keep them well removed from stoves, registers, and the like.



**A PRELIMINARY CATALOGUE OF THE FISHES OF ALASKAN AND  
ADJACENT WATERS.**

**By TARLETON H. BEAN.**

The following is a list of the fishes of Alaska which have been recorded in the principal works relating to the subject. One hundred and sixteen species are named, all of which are in the collection of the United States National Museum except *Pleuronectes Franklinii*, *Muraenoides dolichogaster*, *Sebastichthys ruber* (represented by numerous examples from California and Puget Sound), *Psychrolutes paradoxus*, *Esox lucius*, *Spratelloides bryoporus*, and *Raia batis* of Pallas. The catalogue is, therefore, practically a record of what the Museum has from the Territory. The numbers preceding the localities of the species refer to the Museum register of fishes.

The earlier collections here mentioned were made principally by Messrs. Bannister, Bischoff, Dall, Elliott, Kennicott, and Turner. More recent contributions have been received from Commander L. A. Beardslee, U. S. N., at Sitka, Capt. C. L. Hooper, United States Revenue Marine, in the Arctic, and Mr. William J. Fisher, United States Coast Survey observer, at Kodiak. As will be seen by referring to the list, very large additions were made during the summer of 1880 by Mr. William H. Dall, commanding the United States Coast Survey schooner Yukon, his assistants, and the writer.

The species named are almost wholly shore species, or such as are found in comparatively shallow water; the deep-water fishes of Alaska are still undiscovered, instruments of deep-sea research, except the dredge, not having been employed there.

In the appendix will be found the names of 99 species which have been recorded from waters adjacent to Alaska, many of which will doubtless be found within the limits of the Territory.

For the sake of convenience, the numbers preceding the names of fishes in the faunal tables are the same as in the catalogue.

It is my intention to prepare a detailed account of the fishes here recorded, and it is expected that at least the new species will be represented by illustrations.

**GASTEROSTEIDÆ.**

**1. *Gasterosteus cataphractus* (Pall.) Tilesius.**

Kamtschatka (Pallas); San Francisco and Puget Sound (Jordan & Gilbert).

20489. Sitka. J. A. Fitzgerald.

28053. Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.

28077. Refuge Cove, Cook's Inlet, July 6, 1880. Dall & Bean.

27994. Chugachik Bay, Cook's Inlet, July 1, 1880. Dall & Bean.

28069. Chugachik Bay, Cook's Inlet, July 2, 1880. T. H. Bean.  
 28068. ♀ St. Paul, Kodiak, July 10, 1880. Dall & Bean.  
 23989. Sanborn Harbor, Unga Island, Shumagins. W. H. Dall.  
 28074. Unga Island, Shumagins, July 18, 1880. E. P. Herendeen.  
 28026. Humboldt Harbor, Shumagins, July 20, 1880. E. P. Herendeen.  
 28094. Little Koniushu Island, Shumagins, July 16, 1880. W. H. Dall.  
 27965. Iliuliuk, Unalashka, July 31, 1880. Dall & Bean.  
 23987. Unalashka. W. H. Dall.  
 23953. Amchitka. W. H. Dall.  
 24068 (1039). Amchitka, July, 1873. W. H. Dall.  
 23968. Kyska Harbor. W. H. Dall.  
 23988. St. Paul Island, Bering Sea, 1872. H. W. Elliott.  
 27998. St. Paul Island, Bering Sea, August 6, 1880. Dall & Bean.  
 6757. Near Bering Island. H. M. Bannister.

## 2. *Gasterosteus microcephalus* Girard.

Tulare County, California (Cooper); San Pedro, Monterey Bay, and San Francisco, California (Jordan & Gilbert); Puget Sound (Jor. & Gilb.).

28090. Piseco Lake, Sitka, May 31, 1880. T. H. Bean.  
 28016. St. Paul, Kodiak (fresh-water lake), July 13, 1880. Baker & Bean.  
 24058 (1150). Chirikoff Island, June, 1874. W. H. Dall.  
 28051. Iliuliuk Lake, Unalashka, August 1, 1880. Sylvanus Bailey.

## 3. *Gasterosteus pungitius* L. subsp. *brachypoda*, Bean.

28017. St. Paul, Kodiak (fresh-water lake), July 13, 1880. Baker & Bean.  
 28076. Unga Island, Shumagins, July 18, 1880. E. P. Herendeen.  
 28085. Iliuliuk Lake (fresh water), Unalashka, August 1, 1880. Sylvanus Bailey.  
 24015. St. Paul Island, Bering Sea. H. W. Elliott.  
 6666. St. Michael's. H. M. Bannister.  
 6671. St. Michael's. H. M. Bannister.  
 23997. St. Michael's, 1876. L. M. Turner.  
 27530. Port Clarence, September 6, 1880. Dall & Bean.  
 27590. Elephant Point, Eschscholtz Bay, September 2, 1880. Dall & Bean.  
 27587. Near Icy Cape, Arctic Ocean, August 25, 1880. Dall & Bean.  
 23977. Alaska, 1879. Dr. Robert White.

## AULORHYNCHIDÆ.

### 4. *Aulorhynchus flavidus* Gill.

Monterey Bay, California (Jordan & Gilbert); San Francisco (Peters, Ayres *vide* Gill); Puget Sound (Steind., Jor. & Gilb.).

27510. Sitka, June 2, 1880. Dall & Bean.

## PLEURONECTIDÆ.

### 5. *Pleuronectes stellatus* Pallas.

San Luis Obispo, Monterey, and San Francisco (Jordan & Gilbert); Columbia River and Puget Sound (Jor. & Gilb.); Coppermine R. (Rich); Anderson R. (Baird); Plover Bay (Bean); De Castries Bay (Steind.).

- 28020 (Young). Sitka, June 8, 1880. Dall & Bean.  
 28012. Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.  
 27600. Chugachik Bay, Cook's Inlet, July 1, 1880. E. P. Herendeen.

- 27985 (Young). Chugachik Bay, Cook's Inlet, July 1, 1880. E. P. Herendeen.  
 27622. St. Paul, Kodiak, July 10, 1880. Dall & Bean.  
 27684. St. Paul, Kodiak. Wm. J. Fisher.  
 19708 (1070). Iliuliuk, Unalashka, September 3, 1873. W. H. Dall.  
 19709 (1071). Iliuliuk, Unalashka, September 3, 1873. W. H. Dall.  
 27640. Iliuliuk, Unalashka, October 6, 1880. Dall & Bean.  
 27641. Iliuliuk, Unalashka, July 28, 1880. Dall & Bean.  
 21518. St. Michael's, May 30, 1877. L. M. Turner.  
 27693. Northern Alaska, 1880. Capt. C. L. Hooper.  
 27696. Northern Alaska, 1880. Capt. C. L. Hooper.

6. *Pleuronectes glacialis* Pallas.

*P. glacialis* Pall., Itin. vol. iii, p. 706—River Obi.

? *P. cicatricosus* Pall., Zoog. Ross.—Asiat. iii, 424—"mari inter Camtschatcam et Americam."

27947. Kotzebue Sound, September 2, 1880. Dall & Bean.  
 27700. Northern Alaska, 1880. Capt. C. L. Hooper.

7. *Pleuronectes Franklinii* Günther.

Arctic Seas of America (Günther). Perhaps identical with *P. glacialis* Pallas.

8. *Pleuronectes quadrituberculatus* Pallas.

Sea between Kamtschatka and America (Pallas).

28025. St. Paul, Kodiak, 1880. Wm. J. Fisher.

9. *Lepidopsetta bilineata* (Ayres) Gill.

Monterey Bay and San Francisco, California (Jordan & Gilbert); Puget Sound (Jor. & Gilb.).

27603. Sitka, June 3, 1880. Dall & Bean.  
 28021. Sitka, June 8, 1880. Dall & Bean.  
 27940. Sitka, June 13, 1880. Dall & Bean.  
 27941. Sitka. L. A. Beardslee.  
 28013. Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.  
 27601. Chugachik Bay, Cook's Inlet, July 1, 1880. Sylvanus Bailey.  
 27942. Port Chatham, Cook's Inlet, July 6, 1880. Dall & Bean.  
 27602. St. Paul, Kodiak, July 12, 1880. Dall & Bean.  
 27621. St. Paul, Kodiak, July 12, 1880. Dall & Bean.  
 27673. St. Paul, Kodiak, July 23, 1880. Wm. J. Fisher.  
 27674. St. Paul, Kodiak, July 24, 1880. Wm. J. Fisher.  
 27685. St. Paul, Kodiak, July 23, 1880. Wm. J. Fisher.  
 27686. St. Paul, Kodiak, 1880. Wm. J. Fisher.  
 28041. St. Paul, Kodiak, 1880. Wm. J. Fisher.  
 27644. Humboldt Harbor, Shumagins, July 20, 1880. E. P. Herendeen.  
 27943. Humboldt Harbor, Shumagins, July 19, 1880. Dall & Bean.  
 24018 (Young). Popoff Straits, Shumagins. W. H. Dall.  
 27642. Iliuliuk, Unalashka, July 28, 1880. Dall & Bean.  
 27639. Iliuliuk, Unalashka, July 31, 1880. Sylvanus Bailey.  
 27647. Iliuliuk, Unalashka, October 6, 1880. Dall & Bean.  
 28003. Nateekin Bay, Unalashka, October 8, 1880. Dall & Bean.  
 24009 (Young). Unalashka. W. H. Dall.  
 24019. Unalashka. W. H. Dall.  
 24048. Unalashka. W. H. Dall.

24053. Unalashka. W. H. Dall.

24097 (1062). Nazan Bay, Atka, August 19, 1873. W. H. Dall.

24100 (985). Chichagoff Harbor, Attu, June 20, 1873. W. H. Dall.

24103 (1163). St. Paul Island, July 24, 1874. W. H. Dall.

**10. *Limanda aspera* (Pallas) Bean.**

*Pleuronectes asper* Pall., Zoog. Ross.-As., iii, 425.

**Oceano orientali (Pall.); De Castries Bay (Steind. & Kner).**

27944. Sitka, June 13, 1880. Dall & Bean.

27945. Sitka, June 9, 1880. Sylvanus Bailey.

? 27591 (Juv.). St. Paul, Kodiak, July 10, 1880. W. H. Dall.

27678. St. Paul, Kodiak. William J. Fisher.

27631 ♀. Humboldt Harbor, Shumagins, July 19, 1880. Dall & Bean.

27632 ♀. Humboldt Harbor, Shumagins, July 19, 1880. Dall & Bean.

27527 (Juv.). Port Clarence, September 6, 1880. Dall & Bean.

27550 (Juv.). Plover Bay, Siberia, August 13, 1880. Dall & Bean.

27593 (Juv.). Indian Point, Siberia, August 15, 1880. W. H. Dall.

**11. *Hippoglossoides elassodon* Jordan & Gilbert.**

**Puget Sound (Jor. & Gilb.).**

27937. St. Paul, Kodiak, July 10, 1880. Dall & Bean.

27938. Humboldt Harbor, Shumagins, July 19, 1880. Dall & Bean.

27939. Hiliuk, Unalashka, July 28, 1880. Dall & Bean.

23970 (Juv.). Alaska. W. H. Dall.

? 24020 (Juv.). St. Michael's. W. H. Dall.

**12. *Hippoglossus vulgaris* Fleming.**

Sea between Kamtchatka and America (Pallas, as *Pleuronectes hippoglossus*); San Francisco and Puget Sound (Jordan & Gilbert); Sitka (Bean).

27652. Port Althorp, June 20, 1880. Dall & Bean.

27670. Port Althorp, June 20, 1880. Dall & Bean.

27707. Port Althorp, June 20, 1880. Dall & Bean.

27706. Chugachik Bay, Cook's Inlet, July 2, 1880. H. W. McDonald.

27708. Chugachik Bay, Cook's Inlet, July 1, 1880. Sylvanus Bailey.

27604. Off Marmot Island, near Kodiak, July 8, 1880. Dall & Bean.

27605. St. Paul, Kodiak, July 10, 1880. Dall & Bean.

22466 (1098). Unalashka. W. H. Dall.

22467. St. Michael's, 1876. L. M. Turner.

**13. *Atheresthes stomias* Jordan & Gilbert.**

**San Francisco (Jor. & Gilb.).**

24096 (1140) (Juv.). Port Etches, 12-18 fms., May, 1874. W. H. Dall.

27677. Off Afognak Island, 1880. William J. Fisher.

27683. Off Afognak Island, 1880. William J. Fisher.

27936. Off Popoff Island, Shumagins, July 19, 1880. T. H. Bean.

**GADIDÆ.**

**14. *Pollachius chalcogrammus* (Pallas) Jordan & Gilbert.**

Monterey Bay, California (Jor. & Gilb.); Puget Sound (Jor. & Gilb.); Okhotsk and Kamtchatka Seas (Pallas, as *Gadus chalcogrammus*).

27989. Chugachik Bay, Cook's Inlet, July 1, 1880. Dall & Bean.

? 28081 (Juv.). Refuge Cove, Cook's Inlet, July 6, 1880. Dall & Bean.

27637. Pirate Cove, Shumagins, July 19, 1880. W. H. Dall.  
 27741. Pirate Cove, Shumagins, July 19, 1880. W. H. Dall.  
 27742. Pirate Cove, Shumagins, July 19, 1880. E. P. Herendeen.  
 19710. Humboldt Harbor, Shumagins. W. H. Dall.  
 23972. Lat.  $52^{\circ} 32' (?)$  N., lon.  $164^{\circ} 20'$  W., September, 1865. George Davidson.  
 27918 (Juv.). Iliuliuk, Unalashka, July 31, 1880. Dall & Bean.  
 27958 (Juv.). Iliuliuk, Unalashka, July 31, 1880. Dall & Bean.  
 27957 (Juv.). Chernofsky, Unalashka, October 2, 1880. Dall & Bean.

15. *Boreogadus saida* (Lepech.) Bean.

? *Gadus pygmaeus* Pallas, Zoog. Ross.-As., iii. Off Mount St. Elias.

21525. St. Michael's, February, 1877. L. M. Turner.  
 21526. St. Michael's, February, 1877. L. M. Turner.  
 24031. St. Michael's, February, 1877. L. M. Turner.  
 24070 (1056). Alaska. L. M. Turner.  
 ?28096 (Juv.). Lat.  $66^{\circ} 45'$  N., lon.  $166^{\circ} 35'$  W., August 19, 1880. Herendeen & Bean.  
 27570 (Juv.). Cape Lisburne, Arctic O., August 21, 1880. Dall & Bean.  
 27542. Plover Bay, Siberia, September 14, 1880. Dall & Bean.  
 27549. Plover Bay, Siberia, August 13, 1880. Dall & Bean.  
 27576. Plover Bay, Siberia, 1880. E. P. Herendeen.  
 28005. Plover Bay, Siberia, August 12, 1880. Dall & Bean.

16. *Gadus morrhua* Linnaeus.

Puget Sound (Jordan & Gilbert); Cook's Inlet (Bean); between Kamtchatka and America (Pallas, Zoog., 181); De Castries Bay (Steindachner, as *G. macrocephalus*).

27654. Sitka, May 30, 1880. Dall & Bean.  
 27746. Old Sitka, June 10, 1880. Dall & Bean.  
 27606. Old Sitka, June 12, 1880. Dall & Bean.  
 27655. Off Marmot Island, July 8, 1880. Dall & Bean.  
 27656. Off Marmot Island, July 8, 1880. Dall & Bean.  
 27973. St. Paul, Kodiak, July 13, 1880. Dall & Bean.  
 24109 (924) (Juv.). Popoff Strait, July 5, 1872. Capt. W. G. Hall.  
 27589 (Juv.). Belkofsky, July 23, 1880. Sylvanus Bailey.  
 24032. Iliuliuk, Unalashka. W. H. Dall.  
 24035. Unalashka. W. H. Dall.  
 24040 (Juv.). Iliuliuk, Unalashka. W. H. Dall.  
 28043 (Juv.). Iliuliuk, Unalashka, October 6, 1880. Dall & Bean.  
 27956 (Juv.). Chernofsky, Unalashka, October 2, 1880. Dall & Bean.  
 28007 (Juv.). Chernofsky, Unalashka, October 1, 1880. Dall & Bean.  
 28072 (Juv.). Chernofsky, Unalashka, October 2, 1880. Dall & Bean.  
 ?24029. St. Paul Island, 9 fathoms. W. H. Dall.

17. *Microgadus proximus* (Girard) Gill.

Monterey and San Francisco, California (Jordan & Gilbert); Puget Sound (Jor. & Gilb.).

27982. Yakutat Bay, June 24, 1880. Dall & Bean.  
 ?28059 (Juv.). Yakutat Bay, June 24, 1880. Dall & Bean.

18. *Tilesia gracilis* (Tiles.) Swainson.

*Gadus gracilis* Tiles; *G. wachna* Pallas.

27931. Port Chatham, Cook's Inlet, July 6, 1880. Dall & Bean.  
 27932. St. Paul, Kodiak, July, 1880. Dall & Bean.



27909. St. Paul, Kodiak, 1880. Wm. J. Fisher.  
 9286. St. Michael's. H. M. Bannister.  
 27950. Port Clarence, September, 1880. Dall & Bean.

19. *Lota maculosa* (Le S.) Rich.

9607. Nulato, Yukon River. R. Kennicott?  
 10102 (647). Nulato, Yukon River. W. H. Dall.

LYCODIDÆ.

20. *Gymnelis viridis* (Fabr.) Reinhardt.

23956. Coal Harbor, Shumagins. W. H. Dall.  
 23969. St. Michael's, October 10, 1876. L. M. Turner.  
 26623. Plover Bay, Siberia, September 14, 1880. Dall & Bean.  
 27538 (Juv.). Plover Bay, Siberia, September 14, 1880. Dall & Bean.  
 ?24001. Unalashka. W. H. Dall.

21. *Lycodes Turnerii* Bean.

- 21529 (Type). St. Michael's, March 28, 1876. L. M. Turner.  
 27659 (Juv.). Plover Bay, Siberia, August 13, 1880. Dall & Bean.

22. *Lycodes coccineus* Bean.

- 27743 (Type). Big Diomedé Island, September 10, 1880. T. H. Bean.

STICHÆIDÆ.

23. *Stichæus punctatus* (Fabr.) Reinhardt.

26622. St. Paul, Kodiak, 1880. Wm. J. Fisher.  
 27581. St. Paul, Kodiak, June 10, 1880. W. H. Dall.  
 21718. St. Michael's, June, 29, 1874. L. M. Turner.  
 24012. St. Michael's. H. M. Bannister.

24. *Stichæus* (?) *Rothrockii* Bean.

This may represent a distinct genus—see Proc. U. S. Nat. Mus., vol. iv, p. 147.

- 27573 (Types). Cape Lisburne, 1880. Dall & Bean.  
 27565 (Types). Plover Bay, Siberia, 1880. T. H. Bean.  
 27580 (Types). Plover Bay, Siberia, 1880. E. P. Herendeen.

25. *Lumpenus anguillaris* (Pallas) Girard.

San Francisco to Bellingham Bay (Cooper); Bellingham Bay (Suckley); Puget Sound (Jordan & Gilbert); Kamtchatka, Aleutians, and mainland of Alaska (Pallas).

27951. Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.  
 28067. Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.  
 27988. Chugachik Bay, Cook's Inlet, July 1, 1880. Dall & Bean.  
 24077 (1211). Port Levasheff, Unalashka, September 18, 1874. W. H. Dall.  
 27525. Iliuliuk, Unalashka, July 28, 1880. Dall & Bean.  
 28009. Chernoofsky, Unalashka, October 1, 1880. Dall & Bean.  
 ?27554 (Juv.). Point Belcher, Arctic Ocean, August 27, 1880. Dall & Bean.  
 27544. Plover Bay, Siberia, August 13, 1880. T. H. Bean.  
 27575. Plover Bay, Siberia, August 13, 1880. E. P. Herendeen.  
 26621. Plover Bay, Siberia, September 15, 1880. Dall & Bean.

XIPHISTERIDÆ.

26. *Xiphister rupestris* Jordan & Gilbert.

Monterey Bay, California (Jor. & Gilb.); Puget Sound (Jor. & Gilb.).

7813. Vancouver Island. S. W. Hewson.

27502. Sitka. L. A. Beardslee.

27508. Sitka, May 30, 1880. Sylvanus Bailey.

24017. Alaska. W. H. Dall.

27. *Xiphister chirus* Jordan & Gilbert.

Monterey Bay and Puget Sound (Jordan & Gilbert).

23958. Adakh. W. H. Dall.

23964. Amchitka. W. H. Dall.

28. *Anoplarchus atropurpureus* (Kittlitz) Gill.

Monterey Bay, San Francisco, and Puget Sound (Jordan & Gilbert, as *A. alectrolophus*); Vancouver Island and Fraser's River (Günther, as *A. crista-galli*).

27501. Sitka. L. A. Beardslee.

27509. Sitka, June 1, 1880. T. H. Bean.

28054. Port Mulgrave, June 24, 1880. T. H. Bean.

24014. Kodiak. Jno. C. Tidball.

24064 (1146). Chagafka Cove, Kodiak, June, 1874. M. Baker.

24098 (1147). Chagafka Cove, Kodiak, June, 1874. M. Baker.

28034. St. Paul, Kodiak, 1880. Wm. J. Fisher.

28088. St. Paul, Kodiak, 1880. Wm. J. Fisher.

23948. Coal Harbor, Shumagins. W. H. Dall.

23955. Coal Harbor, Shumagins. W. H. Dall.

24005. Coal Harbor, Shumagins. W. H. Dall.

23980. Sanborn Harbor, Shumagins. W. H. Dall.

23991. Sanborn Harbor, Shumagins. W. H. Dall.

24078 (953). Sanborn Harbor, Shumagins, July, 1872. Capt. W. G. Hall.

24086. Popoff Straits, Shumagins. W. H. Dall.

27584. Iliuliuk, Unalashka, July 28, 1880. S. Bailey.

23994. Unalashka. W. H. Dall.

24084 (1187). Unalashka. W. H. Dall.

24080 (1060). Nazan Bay, Atka, August 19, 1873. W. H. Dall.

23949. Amchitka. W. H. Dall.

23963. Amchitka. W. H. Dall.

24071 (1025). Kyska Harbor, July, 1873. W. H. Dall.

24057. Port Etches. W. H. Dall.

6758. St. Michael's. H. M. Bannister.

22018. St. Michael's, October 10, 1876. L. M. Turner.

23979. St. Michael's. L. M. Turner.

29. *Murænoides dolichogaster* (Pallas) Gill.

Kamtschatka (Pallas); De Castries Bay (Steind. & Kner); Aleutian Islands (Pallas).

30. *Murænoides ornatus* (Girard) Gill.

Puget Sound (Jordan & Gilbert).

24117. Sitka. L. A. Beardslee.

27503. Sitka. L. A. Beardslee.

27517. Sitka (Indian River), June 8, 1880. Dall & Bean.  
 27996. Sitka, June 2, 1880. Dall & Bean.  
 27532. Sitka, June 3, 1880. Dall & Bean.  
 24117. Sitka. W. H. Dall.  
 28035. Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.  
 24056. Port Etches. W. H. Dall.  
 27568. Chugachik Bay, Cook's Inlet, July 1, 1880. Dall & Bean.  
 28078. Refuge Cove, Cook's Inlet, July 6, 1880. Dall & Bean.  
 23992. Kodiak. W. G. W. Harford.  
 24102 (1147) (Juv.). Chagafka Cove, Kodiak, June, 1874. M. Baker.  
 28062. St. Paul, Kodiak, July 12, 1880. W. H. Dall.  
 23946. Coal Harbor, Shumagins. W. H. Dall.  
 24105 (928) (Juv.). Coal Harbor, Shumagins, July 3, 1872. W. G. Hall.  
 23981. Sanborn Harbor, Shumagins. W. H. Dall.  
 27585. Belkoffsky, Aliaska Peninsula, July 23, 1880. W. H. Dall.  
 27521. Iliuliuk, Unalashka, July 28, 1880. Dall & Bean.  
 27962. Iliuliuk, Unalashka. Dall & Bean.  
 27916. Iliuliuk, Unalashka, August 2, 1880. Dall & Bean.  
 28044. Iliuliuk, Unalashka, October 6, 1880. Dall & Bean.  
 23993. Unalashka. W. H. Dall.  
 24002. Unalashka. W. H. Dall.  
 23975. Atka. W. H. Dall.  
 23957. Adakh. W. H. Dall.  
 23950. Amchitka. W. H. Dall.  
 23960. Amchitka. W. H. Dall.  
 24173. Attu, June 23, 1879. Dr. Robert White.  
 24006. Port Moller. W. H. Dall.

### 31. *Muraenoides maxillaris* Bean.

23999. (Type) St. Paul Island, 1872. H. W. Elliott.

## ANARRHICHADIDÆ.

### 32. *Anarrhichas lepturus* Bean.

- 21509 (Type). St. Michael's, 1877. L. M. Turner.  
 21510 (Type). St. Michael's, June 24, 1876. L. M. Turner.  
 (—) Collection of Alaska Commercial Company, San Francisco.

## TRACHINIDÆ.

### 33. *Bathymaster signatus* Cope.

Washington Territory (Bean); Puget Sound (Jordan & Gilbert).

24036. Sitka, October 5, 1861. W. G. W. Harford.  
 27924. Sitka, June 7, 1880. T. H. Bean.  
 27925. Sitka, 1880. L. A. Beardslee.  
 27970. St. Paul, Kodiak, 1880. Wm. J. Fisher.  
 23954. Coal Harbor, Shumagins. W. H. Dall.  
 24004. Coal Harbor, Shumagins. W. H. Dall.  
 27646. Off Popoff Island, Shumagins, July 19, 1880. E. P. Herendeen.  
 27645. Iliuliuk, Unalashka, July 28, 1880. Dall & Bean.  
 23976. Unalashka. W. H. Dall.  
 24003. Unalashka. W. H. Dall.  
 24016. Unalashka. W. H. Dall.  
 24092. Unalashka. W. H. Dall.

TRICHODONTIDÆ.

34. *Trichodon Stelleri* C. & V.

23947. Coal Harbor, Shumagins. W. H. Dall.  
 27950. Humboldt Harbor, Unga Island, Shumagins, July 21, 1880. Marcus Baker.  
 23933. Unalashka. W. H. Dall.  
 24054. Unalashka. W. H. Dall.  
 24033 (1184). Unalashka, September 1, 1874. W. H. Dall.  
 24050 (1168). Cape Etolin, Nunivak Island, July, 1874. W. H. Dall.

CYCLOPTERIDÆ.

35. *Eumicrotremus spinosus* (Fabr.) Gill.

*Cyclopterus orbis* Günther (Esquimault Harbor).

27505. Iliuliuk, Unalashka (from stomach of *Alepidosaurus ferox*), October, 1880.  
 T. H. Bean.  
 27506. Iliuliuk, Unalashka (from stomach of *Alepidosaurus ferox*), October, 1880.  
 T. H. Bean.  
 27507. Iliuliuk, Unalashka (from stomach of *Alepidosaurus ferox*), October, 1880.  
 T. H. Bean.  
 ———. St. Paul Island, August, 1868. W. H. Dall.  
 27548. Plover Bay, Siberia, August 13, 1880. Dall & Bean.

LIPARIDIDÆ.

36. *Liparis pulchellus* Ayres.

Monterey and San Francisco, California (Jordan & Gilbert).

725091. St. Paul, Kodiak, 1880. Wm. J. Fisher.  
 27917. Iliuliuk, Unalashka, August 2, 1880. Dall & Bean.

37. *Liparis calliodon* (Pallas) Günther.

Kamtschatka and Aleutian Islands (Pallas).

- 724063 (1137). Port Etches, May, 1874. W. H. Dall.  
 27586. Belkoffsky, Alaska Peninsula, July 23, 1880. W. H. Dall.  
 23990. Sanborn Harbor, Shumagins. W. H. Dall.  
 728037 (Juv.). Nateekin Bay, Unalashka, October 8, 1880. Dall & Bean.  
 723966. Adakh. W. H. Dall.  
 24091 (1055). Bay of Islands, Adakh, August, 1873. W. H. Dall.  
 723951. Amchitka. W. H. Dall.  
 723962. Amchitka. W. H. Dall.  
 724065 (1039). Amchitka, July, 1873. W. H. Dall.  
 723978. St. Michael's. L. M. Turner.  
 27546. Plover Bay, Siberia, August 13, 1880. Dall & Bean.  
 27536. Plover Bay, Siberia, September 14, 1880. Dall & Bean.

38. *Liparis cyclopus* Günther.

Esquimault Harbor (Günth.).

24046. Unalashka. W. H. Dall.  
 24047. Port Moller. W. H. Dall.

39. *Liparis gibbus* Bean.

24010. Captain's Bay, Unalashka. W. H. Dall.  
 24047 (Type). St. Paul Island, 1872. H. W. Elliott.  
 27545 (Type). Plover Bay, Siberia, August 13, 1880. Dall & Bean.  
 27535 (Type). Plover Bay, Siberia, September 14, 1880. Dall & Bean.  
 26625 (Type). Off Cape Tchaplín, Siberia, August 15, 1880. Dall & Bean.

## AGONIDÆ.

40. *Siphagonus barbatus* Steindachner.

Hakodadi and Nagasaki, Japan (Steind.); "Eismeer, zunächst der Behringsstrasse" (Steind.).

28052. Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.

14932. Unalashka. W. H. Dall.

27529. Port Clarence, September 6, 1880. Dall & Bean.

41. *Podothecus acipenserinus* (Pallas) Gill.

Puget Sound (Jordan & Gilbert); Vancouver Island, Gulf of Georgia (Günther); Unalashka (Pallas).

17125. Port Townsend, Washington Territory, April 6, 1877. J. G. Swan.

7319. Vancouver Island. A. W. Hewson.

?27583 (Juv.). St. Paul, Kodiak. W. H. Dall.

24011 (Juv.). Unalashka. W. H. Dall.

?27574 (Juv.). Cape Lisburne, Arctic O., August 21, 1880 (no barbels). Dall & Bean.

10134. Alaska.

42. *Podothecus trispinosus* (Lockington) Jordan & Gilbert.

Santa Barbara and San Francisco, California (Jor. & Gilb.).

24060. Sitka. W. H. Dall.

## COTTIDÆ.

43. *Cottus tæniopterus* Kner.

Wien. Sitzb. lviii; 1 Abth., 310, taf. 4, fig. 10.

?24062 (Juv.). Hagmeister. W. H. Dall.

21522. St. Michael's. L. M. Turner.

21523. St. Michael's. L. M. Turner.

28004. Point Belcher, Arctic O., August 27, 1880. Dall & Bean.

?27559 (Juv.). Head of Plover Bay, Siberia, August 12, 1880. T. H. Bean.

44. *Cottus polyacanthocephalus* Pallas.

Puget Sound (Jordan & Gilbert); Off Mount St. Elias (Pallas).

27661. Sitka. L. A. Beardslee.

27512 (Juv.). Sitka, June 2, 1880. Dall & Bean.

27607. Sitka, June 6, 1880. Dall & Bean.

27665. Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.

27997. Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.

28039. Refuge Cove, Cook's Inlet, July 6, 1880. Dall & Bean.

27625. St. Paul, Kodiak, July 11, 1880 (head). B. G. McIntyre.

28063. St. Paul, Kodiak, July 12, 1880. W. H. Dall.

27986. St. Paul, Kodiak, July 24, 1880. Wm. J. Fisher.

29033. St. Paul, Kodiak. Wm. J. Fisher.

27623. Humboldt Harbor, Shumagins, July 19, 1880. Dall & Bean.

27624. Pirate Cove, Popoff Island, Shumagins, July 19, 1880. Dall & Bean.

28031. Popoff Island, Shumagins, July 20, 1880. Dall & Bean.

19698 (1078). Iliuliuk, Unalashka, September 3, 1873. W. H. Dall.

19699 (1079). Iliuliuk, Unalashka, September 3, 1873. W. H. Dall.

27520. Iliuliuk, Unalashka, July 28, 1880. Dall & Bean.

27643. Iliuliuk, Unalashka, July 28, 1880. Dall & Bean.



27964. Iliuliuk, Unalashka, July 31, 1880. Dall & Bean.
27638. Iliuliuk, Unalashka, October 15, 1880. Dall & Bean.
27671. Iliuliuk, Unalashka, October 15, 1880. Dall & Bean.
27946. Iliuliuk, Unalashka, October 6, 1880. Dall & Bean.
23499. Unalashka. W. H. Dall.
- 24075 (1215) (Juv.). Unalashka, 60 fms., September 18, 1874. W. H. Dall.
28008. Chernoffsky, Unalashka, October 1, 1880. Dall & Bean.
27955. Chernoffsky, Unalashka, October 1, 1880. Dall & Bean.
- 24099 (1062). Nazan Bay, Atka, August 19, 1873. W. H. Dall.
23965. Amchitka. W. H. Dall.
- ?23935 (Juv.). Port Moller. W. H. Dall.
- ?27571 (Juv.). Cape Lisburne, Arctic O., August 21, 1880. Dall & Bean.
- ?27543 (Juv.). Plover Bay, Siberia, September 14, 1880. Dall & Bean.
23944. (Juv.) Alaska. W. H. Dall.
45. *Cottus niger* Bean.
  23937. Sanborn Harbor, Shumagins. W. H. Dall.
  23928. St. Paul Island, 1872. H. W. Elliott.
  23929. St. Paul Island, 1872. H. W. Elliott.
  - 27952 (Types). St. Paul Island, August 6, 1880. John Armstrong.
  - 27971 (Types). St. Paul Island, August 6, 1880. John Armstrong.
46. *Cottus humilis* Bean.
  21519. St. Michael's, 1877. L. M. Turner.
  21520. St. Michael's, 1877. L. M. Turner.
  21521. St. Michael's, June 11, 1875. L. M. Turner.
  - 27972 (Type). Chamisso Island, Eschscholtz Bay, August 31, 1880. Dall & Bean.
  - 27553 (Juv.). Point Belcher, Arctic Ocean, August 27, 1880. Dall & Bean.
  - ?24013 (Juv.). Alaska.
47. *Aspidocottus bison* Girard.

San Francisco and Puget Sound (Jordan & Gilbert).

  27983. Sitka. L. A. Beardslee.
  - 29038 (Juv.). St. Paul, Kodiak. Wm. J. Fisher.
48. *Ceratocottus diceraus* (Pallas) Gill.
  - 23932 (1108). Sitka, 15 fms. gn. md., May, 1874. W. H. Dall.
49. *Uranidea microstoma* Lockington.
  27516. Indian River, Sitka, June 8, 1880. Dall & Bean.
  27534. Indian River, Sitka, June 11, 1880. Sylvanus Bailey.
  - ?23927. Sitka. W. H. Dall.
  - 26922 (Type). Kodiak. W. N. Lockington.
  28071. St. Paul, Kodiak, 1880. Wm. J. Fisher.
  27596. Aleutian Islands. A. Greenebaum.
  28083. Iliuliuk, Unalashka, August 1, 1880. Sylvanus Bailey.
50. *Gymnacanthus pistilliger* (Pallas) Gill.

Kamtehatka and Unalashka (Pallas).

  - 24089 (1014 & 1015). Kyska Harbor, July 7, 1873. W. H. Dall.
  - ?27592 (Juv.). Point Belcher, Arctic Ocean, August 27, 1880. Dall & Bean.
  - 27560 (Juv.). Plover Bay, Siberia, August 12, 1880. T. H. Bean.
  26626. Off Cape Tchaplín, Siberia, August 15, 1880. W. H. Dall.

**51. *Gymnacanthus galeatus* Bean.**

28097 (Types). Iliulink, Unalashka, July 30, 1880. Dall &amp; Bean.

?27595 (Juv.). Off Cape Sabine, Arctic Ocean, August 24, 1880. Dall &amp; Bean.

**52. *Artedius notospilotus* Girard.**

Santa Barbara, San Luis Obispo, and San Francisco, California (Jor. &amp; Gilb.); Puget Sound (Jor. &amp; Gilb.).

23936. Sanborn Harbor, Shumagins. W. H. Dall.

23934. Unalashka. W. H. Dall.

23933. Unalashka. W. H. Dall.

**53. *Hemilepidotus trachurus* (Pallas) Günther.**San Francisco and Puget Sound (Jordan & Gilbert, as *H. Gibbsii*).

27609. Sitka, May 28, 1880. Dall &amp; Bean.

27610. Sitka, May 29, 1880. Dall &amp; Bean.

27750. Sitka, June 2, 1880. Dall &amp; Bean.

27511 (Juv.). Sitka, June 2, 1880. Dall &amp; Bean.

27901. Sitka, 1880. L. A. Beardslee.

27664. Port Althorp, June 20, 1880. Dall &amp; Bean.

24104 (1140) (Juv.). Port Etches, 12 to 18 fms., May, 1874. W. H. Dall.

27608. Port Chatham, Cook's Inlet, July 5, 1880. Dall &amp; Bean.

?24094 (Juv.). Popoff Strait. W. H. Dall.

24107 (925) (Juv.). Popoff Strait, Shumagins, July 3, 1872. W. H. Dall.

?24066 (931) (Juv.). Coal Harbor, Shumagins, July, 1872. W. G. Hall.

?24090 (934) (Juv.). Coal Harbor, Shumagins, July, 1872. W. G. Hall.

23939 (Juv.). Unalashka. W. H. Dall.

23940 (1185) (Juv.). Unalashka, 9 to 16 fms., September 1, 1874. W. H. Dall.

24108 (1013) (Juv.). Kyska, July 7, 1873. W. H. Dall.

24101 (1014) (Juv.). Kyska. W. H. Dall.

?24079 (1019) (Juv.). Kyska, July 7, 1873. W. H. Dall.

?24072 (1026) (Juv.). Kyska, July, 1873. W. H. Dall.

24095 (1036) (Juv.). Kyska, 10 fms. in Pass, July, 1873. W. H. Dall.

?24076 (1062) (Juv.). Nazan Bay, Atka, Aug. 19, 1873. W. H. Dall.

?24059 (1054) (Juv.). Bay of Islands, Adakh, August, 1873. W. H. Dall.

?24085 (1040) (Juv.). Amehitka, July 26, 1873.

?24082 (985) (Juv.). Chichagoff Harbor, Attu, June 20, 1873. W. H. Dall.

**54. *Hemilepidotus Jordani* Bean.***Cottus trachurus* Pallas (part), referred to in the following sentence:  
"In majori specimine color supra fuscus, subtus pallido-albus, immaculatus."

27658. Port Althorp, June 20, 1880. Dall &amp; Bean.

27659. Port Chatham, Cook's Inlet, July 6, 1880. Dall &amp; Bean.

27660. Port Chatham, Cook's Inlet, July 6, 1880. Dall &amp; Bean.

27611. St. Paul, Kodiak, July 12, 1880. Dall &amp; Bean.

29036. St. Paul, Kodiak. Wm. J. Fisher.

27612. Humboldt Harbor, Shumagins, July 17, 1880. Dall &amp; Bean.

27613. Humboldt Harbor, Shumagins, July 17, 1880. Dall &amp; Bean.

27614. Humboldt Harbor, Shumagins, July 17, 1880. Dall &amp; Bean.

27615. Humboldt Harbor, Shumagins, July 17, 1880. Dall &amp; Bean.

27634. Humboldt Harbor, Shumagins, July 19, 1880. Dall &amp; Bean.

27598 (Type). Iliulink, Unalashka, July 30, 1880. Sylvanus Bailey.

28033 (Juv.). Iliulink, Unalashka, October 12, 1880. Dall &amp; Bean.

27633. Iliulink, Unalashka, October 15, 1880. Dall &amp; Bean.

23943. Iliulink, Unalashka. W. H. Dall.

27749. Chernofsky, Unalashka, October 1, 1880. Dall &amp; Bean.

27539 (Juv.). Plover Bay, Siberia, September 14, 1880. Dall &amp; Bean.

**55. *Melletes papilio* Bean.**

23751 (Type). St. Paul Island, 1872. H. W. Elliott.

**56. *Leptocottus armatus* Girard.**

San Diego, San Pedro, Santa Barbara, San Luis Obispo, Monterey Bay, and San Francisco, California (Jordan & Gilbert); Puget Sound (Jor. & Gilb.).

6754. Sitka. F. Bischoff.

23931. Sitka (very bad state). C. S. Bulkley.

27968. Sitka, May 31 to June 8, 1880. Dall & Bean.

27976. Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.

29037. St. Paul, Kodiak. Wm. J. Fisher.

**57. *Oligocottus maculosus* Girard.**

San Luis Obispo, Monterey Bay, and San Francisco, California (Jor. & Gilb.); Puget Sound (Jor. & Gilb.).

7815. Vancouver Island. A. W. Hewson.

15029. Victoria. Dall & Brown.

6755. Sitka. F. Bischoff.

7322. Sitka, August 18. W. H. Dall.

27504. Sitka. L. A. Beardslee.

27514. Sitka, June 3, 1880. Dall & Bean.

27531. Sitka, June 3, 1880. Dall & Bean.

27515. Sitka (Indian River), June 8, 1880. Dall & Bean.

28093. Alexandrovsk, Cook's Inlet, July 4, 1880. Dall & Bean.

**58. *Oligocottus globiceps* Girard.**

Monterey Bay and San Francisco, California (Jor. & Gilb.); Puget Sound (Jor. & Gilb.).

6751. Sitka. F. Bischoff.

24083 (1147). Chagafka Cove, Kodiak, June, 1874. M. Baker.

23959. Adakh. W. H. Dall.

23952. Amchitka. W. H. Dall.

**59. *Triglops pingelii* Reinhardt.**

Off Point Bingham, Jacobi Island, Gulf of Alaska (Bean).

27541. Plover Bay, Siberia, September 14, 1880. Dall & Bean.

**60. *Blepsias cirrhosus* (Pallas) Günther.**

San Francisco and Puget Sound (Jordan & Gilbert).

24114. Sitka. L. A. Beardslee.

28051. Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.

24039. Iliuliuk, Unalashka. W. H. Dall.

27522. Iliuliuk, Unalashka, July 28, 1880. Dall & Bean.

27919. Iliuliuk, Unalashka, July 31, 1880. Dall & Bean.

27960. Iliuliuk, Unalashka, July 31, 1880. Dall & Bean.

28073. Chernoffsky, Unalashka, October 2, 1880. Dall & Bean.

24106 (1055) (Juv.). Bay of Islands, Adakh, August, 1873. W. H. Dall.

24088 (1003) (Juv.). Kyska, June 28, 1873. W. H. Dall.

24087 (1035) (Juv.). Kyska, 10 fms. in Pass, July 15, 1873. W. H. Dall.

24030 (Juv.). St. Paul Island, 9 fathoms. W. H. Dall.

**61. *Blepsias bilobus* Cuv. & Val.**

Kamtschatka (Günther).

28061. St. Paul, Kodiak, 1880. Wm. J. Fisher.

**62. *Nautichthys oculofasciatus* Girard.**

San Francisco and Puget Sound (Jordan &amp; Gilbert).

23941 (1185) (Juv.). Unalashka, Sept. 1, 1874. W. H. Dall.

24073 (1054) (Juv.). Bay of Islands, Adakh, August, 1873. W. H. Dall.

24067 (Juv.). Kyska. W. H. Dall.

27582 (Juv.). St. Paul, Kodiak, July 10, 1880. W. H. Dall.

28036 (Juv.). St. Paul, Kodiak, July 12, 1880. W. H. Dall.

**63. *Rhamphocottus richardsoni* Günther.**

California (Lockington); Fort Rupert, North America (Günther).

26620. St. Paul, Kodiak, 1880. Wm. J. Fisher.

## HEMITRIPTERIDÆ.

**64. *Hemitripteris americanus* (Gmel.) Storer.***H. carifrons* Lockington, Kodiak.

I have compared Lockington's type with *H. americanus* in the museum of the California Academy of Sciences.

## SCORPÆNIDÆ.

**65. *Sebastichthys maliger* Jordan & Gilbert.**

Monterey Bay and San Francisco, California (Jor. & Gilb.); Puget Sound (Jor. & Gilb.).

27713. Sitka, June 2, 1880. Dall &amp; Bean.

27922 (Juv.). Sitka, June 9, 1880. Corbin Ball.

**66. *Sebastichthys caurinus* (Rich.) Jor. & Gilb.**

Puget Sound (Jor. &amp; Gilb.).

27714. Old Sitka, June 10, 1880. T. H. Bean.

**67. *Sebastichthys ruber* (Ayres) Lockington.**

Santa Barbara, Monterey Bay, and San Francisco, California (Jor. & Gilb.); Puget Sound (Jor. & Gilb.); off Point Bingham, Jacobi Island, Gulf of Alaska (Bean).

**68. *Sebastichthys melanops* (Girard) Jor. & Gilb.**

Monterey Bay and San Francisco (Jor. & Gilb.); Puget Sound (Jor. & Gilb.).

27628. Sitka, May 28, 1880. Dall &amp; Bean.

27921. Sitka, May 28, 1880. A. T. Whitford.

27747. Sitka. L. A. Beardslee.

27675. St. Paul, Kodiak, 1880. Wm. J. Fisher.

**69. *Sebastichthys ciliatus* (Tiles.).**Aleutians (Pallas, as *Perca variabilis*).

27255. Kodiak. D. S. Jordan.

CHIRIDÆ.

70. *Hexagrammus asper* Steller.

Kamtechatka (Pallas, as *Labrax hexagrammus*).

- 23930. Sitka. C. S. Bulkley.
- 27910. Sitka, May 31, 1880. Dall & Bean.
- 27911. Old Sitka, June 12, 1880. Dall & Bean.
- 27912. Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.
- 28060. Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.
- 28079 (Juv.). Refuge Cove, Cook's Inlet, July 6, 1880. Dall & Bean.
- ?27974 (Juv.). St. Paul, Kodiak, July 13, 1880. Dall & Bean.
- 27650. Iliuliuk, Unalashka, July 31, 1880. Dall & Bean.
- 27961. Iliuliuk, Unalashka, July 31, 1880. Dall & Bean.
- 28045. Iliuliuk, Unalashka, October 6, 1880. Dall & Bean.
- 23982. Unalashka. W. H. Dall.
- 23985. Unalashka. W. H. Dall.
- 23986. Unalashka. W. H. Dall.
- 23974. Atka. W. H. Dall.
- 21530. St. Michael's, June, 1875. L. M. Turner.
- 21531. St. Michael's, June, 1875. L. M. Turner.
- 21532. St. Michael's, June, 1875. L. M. Turner.
- 21533. St. Michael's, February, 1877. L. M. Turner.
- 27528 (Juv.). Port Clarence, September 6, 1880. Dall & Bean.

71. *Hexagrammus ordinatus* (Cope) Bean.

- 27987. Old Sitka, June 2, 1880. Dall & Bean.
- 28027. Popoff Island, Shumagins, July 20, 1880. Dall & Bean.
- 27523. Iliuliuk, Unalashka, July 28, 1880. Dall & Bean.
- 27648. Iliuliuk, Unalashka, July 28, 1880. Dall & Bean.
- 27649. Iliuliuk, Unalashka, July 31, 1880. Dall & Bean.
- 27967. Iliuliuk, Unalashka, July 31, 1880. Dall & Bean.
- 27975. Iliuliuk, Unalashka, October 6, 1880. Dall & Bean.
- 27935. Chernoffsky, Unalashka, October 2, 1880. Dall & Bean.
- 24042. Unalashka. W. H. Dall.
- 24043. Unalashka. W. H. Dall.

72. *Hexagrammus superciliosus* (Pallas) Jor. & Gilb.

Monterey Bay and San Francisco (Jor. & Gilb.); Puget Sound (Jor. & Gilb.); Unalashka (Pallas).

- 5606. Sitka. F. Bischoff.
- 27666. Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.
- 27913. St. Paul, Kodiak, July 10, 1880. Dall & Bean.
- 29034. St. Paul, Kodiak. Wm. J. Fisher.
- 24051. Kodiak. F. Bischoff.
- 27934. Chernoffsky, Unalashka, October 2, 1880. Dall & Bean.
- 24172 (Skin). Attu, 1879. Dr. Robert White.

73. *Hexagrammus scaber* Bean.

- 23961 (Juv.) (Type). Amchitka. W. H. Dall.
- 27920 (Juv.) (Type). Iliuliuk, Unalashka, July 31, 1880. T. H. Bean.



**74. Hexagrammus decagrammus** (Pallas) Jor. & Gilb.

San Luis Obispo, Monterey Bay, and San Francisco (Jor. & Gilb.); Puget Sound (Jor. & Gilb.); off Mount St. Elias, Gulf of Alaska (Pallas).

27627. Sitka, June 3, 1880. Dall & Bean.  
 27709 ♀. Old Sitka, June 10, 1880. Dall & Bean.  
 27626. Old Sitka, June 12, 1880. Dall & Bean.  
 27710 ♂. Old Sitka. L. A. Beardslee.  
 27711 ♀. Old Sitka. L. A. Beardslee.  
 27653. Chatham Strait, June 20, 1880. Marcus Baker.  
 24022. Unalashka. W. H. Dall.

**75. Pleurogrammus monopterygius** (Pallas) Gill.

Unalashka (Pallas, as *Labrax monopterygius*).

27112. Kodiak. D. S. Jordan.  
 29035. St. Paul, Kodiak. Wm. J. Fisher.  
 27930. Ilinliuk, Unalashka, October 7, 1880. Robert King.  
 27933. Chernoffsky, Unalashka, October 2, 1880. Dall & Bean.  
 27954. Chernoffsky, Unalashka, October 2, 1880. Dall & Bean.  
 24174 (Skin). Attu, June 23, 1879. Dr. Robert White.

**76. Ophiodon elongatus** Girard.

Santa Barbara, San Luis Obispo, Monterey Bay, San Francisco (Jor. & Gilb.); Puget Sound (Jor. & Gilb.).

27657. Sitka, June 7, 1880. Dall & Bean.

**77. Anoplopoma fimbria** (Pallas) Gill.

Monterey Bay, San Francisco, and Puget Sound (Jordan & Gilbert); off Mount St. Elias, Alaska (Pallas, as *Gadus fimbria*).

27745. Sitka. L. A. Beardslee.

## AMMODYTIDÆ.

**78. Ammodytes americanus** De Kay.

*A. personatus* Girard.

Monterey Bay and Puget Sound (Jordan & Gilbert).

- 24055 (1105). Sitka, May, 1874. W. H. Dall.  
 24113. Sitka. L. A. Beardslee.  
 28040. Sitka, May 31, 1880. Dall & Bean.  
 28055. Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.  
 27993. Chugachik Bay, Cook's Inlet, July 1, 1880. Dall & Bean.  
 28070. Port Chatham, Cook's Inlet, July 6, 1880. Dall & Bean.  
 24110 (1152). Semidi Islands, 12 to 28 fms., June, 1874. W. H. Dall.  
 28011. Humboldt Bay, Shumagins, July 21, 1880. H. W. McDonald.  
 24093 (1210). Unalashka, 20 fms., September 18, 1874. W. H. Dall.  
 24028. Ilinliuk, Unalashka, June 4. W. H. Dall.  
 27963. Ilinliuk, Unalashka, July 31, 1880. Dall & Bean.  
 24008. Captain's Bay, Unalashka. W. H. Dall.  
 28006. Chernoffsky, Unalashka, October 1, 1880. Dall & Bean.  
 24034. Unalashka. W. H. Dall.  
 24081 (1038). Constantine Bay, Amchitka, July 24, 1873. W. H. Dall.  
 27526. Port Clarence, September 6, 1880. Dall & Bean.  
 28014. Port Clarence, September 6, 1880. Dall & Bean.

25024. Port Clarence, September 6, 1880. Dall & Bean.  
 27556 (Juv.). Point Belcher, Arctic Ocean, August 27, 1880. Dall & Bean.  
 27562. Plover Bay, Siberia, August 12, 1880. T. H. Bean.  
 27577. Plover Bay, Siberia, August 13, 1880. E. P. Herendeen.

79. *Ammodytes alascanus* Cope.

- ?6667. Sitka. F. Bischoff.  
 24115. Sitka (180 skin-folds). L. A. Beardslee.

PSYCHROLUTIDÆ.

80. *Psychrolutes paradoxus* Günther.

Vancouver Island (Günther); Kodiak Island (collection of Alaska Commercial Company, of San Francisco).

ESOCIDÆ.

81. *Esox lucius* Linn.

Yukon River (Dall).

6886. Fort Simpson, British America.  
 7552. Fort Resolution. R. Kennicott.  
 8827. Fort Rae. R. Kennicott.  
 8158. Slave Lake. R. Kennicott.

UMBRIDÆ.

82. *Dallia pectoralis* Bean.

- 6661 (Types). St. Michael's. H. M. Bannister.  
 23498 (Types). St. Michael's, February, 1877. L. M. Turner.

MICROSTOMIDÆ.

83. *Osmerus dentex* Steindachner.

De Castries Bay, Siberia (Steind.).

- ?28058 (Juv.). Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.  
 21527. St. Michael's, February, 1877. L. M. Turner.  
 21528. St. Michael's, February, 1877. L. M. Turner.  
 27914. Port Clarence, September 8, 1880. Dall & Bean.  
 27981. Port Clarence (dried), September 6, 1880. Dall & Bean.

84. *Osmerus spirinchus* (Pallas)?

? *O. dentex* Steind.

27558. Kotzebue Sound, September 2, 1880. E. P. Herendeen.

85. *Mallotus villosus* (Müller) Cuv.

Kamtschatka and islands between Asia and America (Pallas).

24118. Sitka. L. A. Beardslee.  
 28022. Sitka, September, 1879. L. A. Beardslee.  
 27990. Chugachik Bay, Cook's Inlet, July 1, 1880. T. H. Bean.  
 28080. Refuge Cove, Cook's Inlet, July 6, 1880. Dall & Bean.  
 28038. Off Marmot Island (cod stomach), July 8, 1880. T. H. Bean.  
 6664. St. Michael's. H. M. Bannister.  
 24038. Bering Strait. Wm. Stimpson.  
 27572 (Juv.). Cape Lisburne, Arctic O., August 21, 1880. Dall & Bean.  
 27555 (Juv.). Point Belcher, Arctic O., August 27, 1880. Dall & Bean.  
 27563 (Juv.). Plover Bay, Siberia, August 12, 1880. T. H. Bean.  
 27564 (Juv.). Plover Bay, Siberia, August 12, 1880. T. H. Bean.  
 27579 (Juv.). Plover Bay, Siberia, August 13, 1880. E. P. Herendeen.

**86. *Hypomesus olidus* (Pallas) Gill.**

De Castries Bay (Kuer, as *Osmerus oligodon*); streams and lakes of Kamtchatka (Pallas, as *Salmo olidus*).

23973. St. Michael's, May 20, 1877. L. M. Turner.

24044. St. Michael's. L. M. Turner.

**87. *Hypomesus pretiosus* (Girard) Gill.**

San Francisco and Puget Sound (Jordan & Gilbert, as *H. olidus*.)

27995. Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.

**88. *Thaleichthys pacificus* (Rich.) Girard.**

Columbia River and Puget Sound (Jordan & Gilbert); Vancouver Island (Günther).

24170. Stikene River, July, 1879. Dr. Robert White.

24111. Wrangell, 1880. R. D. Crittenden.

24112. Southern Alaska. L. A. Beardslee.

24116. Sitka. L. A. Beardslee.

24661. Sitka (dried). W. H. Dall.

28001. Chilkat River, June, 1880. Marcus Baker.

24122. Katmai, Aliaska, 1880. B. G. McIntyre.

## COREGONIDÆ.

**89. *Coregonus laurettæ* Bean.**

9606. Nulato, Yukon River. R. Kennicott.

24023. Nulato, Yukon River. W. H. Dall.

24024. Nulato, Yukon River. W. H. Dall.

27915 (Type). Port Clarence, September 8, 1880. T. H. Bean.

27695 (Types). Point Barrow, 1880. Capt. C. L. Hooper.

**90. *Coregonus Merckii* Günther, variety.**

Kolima and other Siberian rivers (Pallas, as *Salmo clupeoides*, *fide* Günther).

23995. St. Michael's, February, 1877. L. M. Turner.

27698. Northern Alaska, 1880. Capt. C. L. Hooper.

**91. *Coregonus clupeiformis* (Mitchill) Milner.**

Great Lake Region to Polar Sea (Jordan).

?7274. Fort Rae, Slave Lake.

9521. St. Michael's. H. M. Bannister.

?23996 (Juv.). St. Michael's. L. M. Turner.

27790. Nulato, Yukon River. W. H. Dall.

27791. Nulato, Yukon River. J. T. Dyer.

24026. Yukon River. W. H. Dall.

**92. *Coregonus Kennicottii* Milner.**

8971 (Type). Fort Good Hope, British America. R. Kennicott.

9605. Nulato, Yukon River. R. Kennicott.

24025. Nulato, Yukon River, March 27, 1867. W. H. Dall.

93. *Coregonus quadrilateralis* Rich.

Arctic Ocean and rivers of Arctic North America (Günther).

27793. Slave Lake. R. Kennicott.

27792. Nulato, Yukon River, April 21, 1867. W. H. Dall.

24000 (Juv.). Fort Yukon, 1877. L. M. Turner.

94. *Thymallus signifer* (Rich.) Cuv. & Val.

Lakes and rivers north of Mackenzie River (Rich.).

9523. St. Michael's. H. M. Bannister.

7993. Nulato, Yukon River. W. H. Dall.

SALMONIDÆ.

95. *Salvelinus malma* (Walb.) Jordan & Gilbert.

? *Salmo curilus* Pallas.

McCloud River, California (Bean); Columbia River and Puget Sound (Jordan & Gilbert).

27731. Sitka, May, 1880. A. T. Whitford.

27734. Sitka, May 31, 1880. L. A. Beardslee.

27739. Sitka. L. A. Beardslee.

27908. Sitka. L. A. Beardslee.

24120. Sitka. L. A. Beardslee.

27730. Silka (Indian River), July to August, 1879. L. A. Beardslee.

27733. Sitka, May 31, 1880. Dall & Bean.

27735. Sitka, May 31, 1880. Dall & Bean.

27513. Sitka (Pyloric caeca), June 2, 1880. T. H. Bean.

27518 (Juv.). Sitka (Indian River), June 8, 1880. Dall & Bean.

27620. Sitka, June 8, 1880. Dall & Bean.

27599. Old Sitka, June 2, 1880. Dall & Bean.

27732. Old Sitka, June 2, 1880. Dall & Bean.

27729. Port Althorp, June 18-19, 1880. Dall & Bean.

27992. Chugachik Bay, Cook's Inlet, July 1, 1880. T. H. Bean.

27728. Refuge Cove, Cook's Inlet, July 6, 1880. Dall & Bean.

27740. Refuge Cove, Cook's Inlet, July 6, 1880. Dall & Bean.

27969. St. Paul, Kodiak, 1880. Wm. J. Fisher.

27727. St. Paul, Kodiak, July 10, 1880. Dall & Bean.

28029. Humboldt Harbor, Shumagins, July 20, 1880. W. H. Dall.

28095 (Juv.). Little Koniusi Island, Shumagins, July 16, 1880. W. H. Dall.

23984. Unalashka. W. H. Dall.

19702 (1080). Unalashka. W. H. Dall.

27726. Iliuliuk, Unalashka, July 28, 1880. Dall & Bean.

27966 (Juv.). Iliuliuk, Unalashka, July 31, 1880. Dall & Bean.

27597. Iliuliuk, Unalashka, July, 1880. Dall & Bean.

28002. Nateekin Bay, Unalashka, October 8, 1880. Dall & Bean.

23967. Kyska Harbor. W. H. Dall.

21511. St. Michael's, February, 1877. L. M. Turner.

21512. St. Michael's, February, 1877. L. M. Turner.

21514. St. Michael's, February, 1877. L. M. Turner.

21517. St. Michael's, March, 1876. L. M. Turner.

21513. Unalaklik River, March, 1876. L. M. Turner.

21515. Unalaklik River, March, 1876. L. M. Turner.

21516. Unalaklik River, March, 1876. L. M. Turner.

27724. Port Clarence, September 8, 1880. Dall & Bean.

- 27691 (Skin). Northern Alaska, 1880. Capt. C. L. Hooper.  
 27692 (Head). Northern Alaska, 1880. Capt. C. L. Hooper.  
 27701 (Skin). Northern Alaska, 1880. Capt. C. L. Hooper.  
 27569 (Juv.). Cape Lisburne, Arctic Ocean, August 21, 1880. Dall & Bean.  
 19707 (966). Alaska. W. H. Dall.  
 27725. Plover Bay, Siberia, August 12-13, 1880. Dall & Bean.  
 28046 (Cæca). Plover Bay, Siberia, August 13, 1880. T. H. Bean.

**96. *Salmo purpuratus* Pallas.**

Monterey Bay, San Francisco, Columbia River, and Puget Sound (Jordan & Gilbert); rivers Bolschaya and Bystraya, Kamtehatka (Pallas).

24119. Sitka. L. A. Beardslee.  
 27902. Sitka, May 29, 1880. L. A. Beardslee.  
 ?27905. Sitka, July or August, 1879. L. A. Beardslee.  
 27906. Sitka, July or August, 1879. L. A. Beardslee.  
 27907. Sitka. L. A. Beardslee.  
 27904. Sitka, May, 1880. A. T. Whitford.  
 27903. Sitka, June 1-3, 1880. W. M. Noyes.  
 24123. St. Paul, Kodiak, 1880. W. G. W. Harford.  
 27690. Northern Alaska, 1880. Capt. C. L. Hooper.  
 27699. Northern Alaska, 1880. Capt. C. L. Hooper.

**97. *Salmo Gairdneri* Rich.**

Monterey Bay, San Francisco, Columbia River, and Puget Sound (Jordan & Gilbert).

- 27662 ♀. Sitka, June 9, 1880. T. H. Bean.  
 27738 ♀ (Skin). Sitka, June 10, 1880. T. H. Bean.  
 24125 (Eggs). Sitka, June 10, 1880. T. H. Bean.  
 27533 ♀ (Pyloric cæca). Sitka, June 10, 1880. T. H. Bean.  
 24124 (Juv.). St. Paul, Kodiak, 1880. W. G. W. Harford.

**98. *Salmo irideus* Gibbons.**

I have doubtfully referred to this species the following young specimens:

28023. Sitka, July or August, 1879. L. A. Beardslee.

**99. *Oncorhynchus chouicha* (Walb.) Jor. & Gilb.**

Monterey Bay, San Francisco, Columbia River, and Puget Sound (Jordan & Gilbert).

- 27676 (Skin). Kassilov River, Cook's Inlet, 1880. William J. Fisher.  
 27680 (Skin). Kassilov River, Cook's Inlet, 1880. William J. Fisher.  
 27679 (Skin). Alaska, 1880. William J. Fisher.  
 27681 (Skin). Alaska, 1880. William J. Fisher.  
 27682 (Spermaries). Alaska, 1880. William J. Fisher.  
 27716 (Belly). Yukon River. Steward of steamer St. Paul.

**100. *Oncorhynchus keta* (Walb.) Gill & Jordan.**

San Francisco, Columbia River, and Puget Sound (Jordan & Gilbert).

- 27737 ♀ (Skin). Old Sitka, June 12, 1880. T. H. Bean.  
 27617 ♂ (Skin). Alexandrovsk, Cook's Inlet, July 4, 1880. J. Cohen.  
 28050 (Cæca and spermaries). Alexandrovsk, Cook's Inlet, July 4, 1880. J. Cohen.  
 27618 (Head). St. Paul, Kodiak, July 13, 1880. Dall & Bean.



- 27619 (Skin). St. Paul, Kodiak, July 11, 1880. Dall & Bean.  
 28010 (Eggs). St. Paul, Kodiak, July 13, 1880. Dall & Bean.  
 27221. Bering Strait, 1880. D. S. Jordan.  
 27687 (Skin). "Northern Alaska," 1880. Capt. C. L. Hooper.  
 27688 (Skin). "Northern Alaska," 1880. Capt. C. L. Hooper.  
 27689 ♂ (Skin). "Northern Alaska," 1880. Capt. C. L. Hooper.  
 27702 (Skin). "Northern Alaska," 1880. Capt. C. L. Hooper.  
 27703 (Skin). "Northern Alaska," 1880. Capt. C. L. Hooper.  
 27704 (Skin). "Northern Alaska," 1880. Capt. C. L. Hooper.

101. *Oncorhynchus nerka* (Walb.) Gill & Jordan.

Columbia River and Puget Sound (Jordan & Gilbert).

- 27635 (Skin). Iliuliuk, Unalashka, July 27, 1880. T. H. Bean.  
 27636 (Skin). Iliuliuk, Unalashka, July 30, 1880. T. H. Bean.

102. *Oncorhynchus kisutch* (Walb.) Jordan & Gilbert.

San Francisco, Columbia River, and Puget Sound (Jordan & Gilbert).

- ?28042 (Juv.). Near Hot Springs, Baranoff Island, June 5, 1880. E. P. Herendeen.  
 27927 (Juv.). Sitka. L. A. Beardslee.  
 28018 (Juv.). Old Sitka, June 2, 1880. T. H. Bean.  
 28056 (Juv.). Port Mulgrave, Yakutat Bay, June 24, 1880. Dall & Bean.  
 27928 (Juv.). Iliuliuk, Unalashka, July 31, 1880. Dall & Bean.  
 ?27959 (Juv.). Iliuliuk, Unalashka, July 31, 1880. Dall & Bean.  
 27929 (Juv.). Iliuliuk, Unalashka, October 6, 1880. Dall & Bean.  
 27712 ♂. Iliuliuk, Unalashka, October 12, 1880. Dall & Bean.  
 27721 ♂ (Skin). Iliuliuk, Unalashka, October 12, 1880. T. H. Bean.  
 28032 ♂ (Cæca). Iliuliuk, Unalashka, October 12, 1880. T. H. Bean.  
 27720 ♂ (Skin). Nateekin Bay, Unalashka, October 8, 1880. T. H. Bean.  
 27722 ♀ (Skin). Nateekin Bay, Unalashka, October 8, 1880. T. H. Bean.  
 27723 ♂. Nateekin Bay, Unalashka, October 8, 1880. Dall & Bean.  
 28036 (Cæca). Nateekin Bay, Unalashka, October 8, 1880. Dall & Bean.  
 27719 ♀ (Skin). Chernoffsky, Unalashka, October 1, 1880. E. P. Herendeen.  
 27953 (Juv.). Chernoffsky, Unalashka, October 1, 1880. Dall & Bean.  
 ?23953 (Juv.). Unalashka. W. H. Dall.

103. *Oncorhynchus gorbuscha* (Walb.) Gill & Jordan.

De Castries Bay (Steindachner, as *O. proteus*); Plover Bay, Siberia (Bean); San Francisco, Columbia River, and Puget Sound (Jordan & Gilbert).

- 27743 ♂ & ♀. Refuge Cove, Cook's Inlet, July 6, 1880. Dall & Bean.  
 27715 ♂ (Skin). St. Paul, Kodiak, July 11, 1880. T. H. Bean.  
 27744 ♀. St. Paul, Kodiak, July 11, 1880. Dall & Bean.

ALEPIDOSAURIDÆ.

104. *Alepidosaurus ferox* Lowe.

- ?24052. Unalashka (bad state). W. H. Dall.  
 27705 (Skin). Iliuliuk, Unalashka, October 7, 1880. Robert King.

105. *Alepidosaurus borealis* Gill.

Puget Sound (Jordan & Gilbert).

23971. Captain's Harbor, Unalashka. Geo. Davidson.

## CLUPEIDÆ.

106. *Clupea mirabilis* Girard.

Kamtschatka (Pallas, as *C. harengus*); San Diego to Puget Sound (Jordan & Gilbert).

27948. Sitka, July, 1879. L. A. Beardslee.  
 27978. Sitka, May, 1880. L. A. Beardslee.  
 27977. Old Sitka, June 10, 1880. Dall & Bean.  
 27979. Port Althorp, June 19, 1880. Dall & Bean.  
 27949. Port Mulgrave, June 24, 1880. Dall & Bean.  
 27923. Chugachik Bay, Cook's Inlet, June 30, 1880. E. P. Herendeen.  
 27984. Chugachik Bay, Cook's Inlet, July 1, 1880. E. P. Herendeen.  
 27566. Chugachik Bay, Cook's Inlet, July 1, 1880. W. H. Dall.  
 27524. Iliuliuk, Unalashka, July 28, 1880. Dall & Bean.  
 27718. Iliuliuk, Unalashka, August 1, 1880. Dall & Bean.  
 27717. Iliuliuk, Unalashka, July 31, 1880. S. Bailey.  
 24021. Unalashka. W. H. Dall.  
 20863. St. Michael's, June 10, 1877. L. M. Turner.  
 20864. St. Michael's, June 10, 1877. L. M. Turner.  
 28019. Port Clarence, September 8, 1880. Dall & Bean.  
 24049. Alaska? W. H. Dall.

107. *Spratelloides bryoporus* Cope.

Alaska (Cope).

## CATASTOMIDÆ.

108. *Catostomus longirostris* Le Sueur.

Nulato, Yukon River (Dall).

## MASTACEMBELIDÆ?

109. *Ptilichthys Goodei* Bean.

26619 (Type). Iliuliuk, Unalashka, July 23, 1880. Dall & Bean.

## ACIPENSERIDÆ.

110. *Acipenser medirostris* Ayres.

San Francisco and Columbia River (Jordan & Gilbert).

27697 (202). "Northern Alaska", 1880. Capt. C. L. Hooper.

If this specimen is really Alaskan, it is the first of its kind from that Territory.

## CHIMÆRIDÆ.

111. *Chimæra Collei* Bennett.

Monterey Bay, San Francisco, and Puget Sound (Jordan & Gilbert); Esquimault Harbor (Günther).

24041. Alaska.

24171 ♂. Alexander Archipelago, July, 1879. Dr. Robert White.

## RAIIDÆ.

112. *Raia binoculata* Girard.

Monterey Bay, San Francisco, and Puget Sound (Jordan & Gilbert).

27667 ♀ (Jaws). Sitka, June 2, 1880. Dall & Bean.

27668 ♀ (Jaws). Sitka, June 3, 1880. Dall & Bean.

- 27669 (Jaws). Port Althorp, June 20, 1880. Dall & Bean.  
 27629 ♂ (Jaws). St. Paul, Kodiak, July 10, 1880. Dall & Bean.  
 27630 ♀ (Jaws). St. Paul, Kodiak, July 10, 1880. Dall & Bean.  
 27672 ♂. St. Paul, Kodiak, July 23, 1880. Wm. J. Fisher.

**113. *Raia parmifera* Bean.**

- 24037 (Jaws and skull). Unalashka. W. H. Dall.  
 27651 ♀ (Type). Iliuliuk, Unalashka, October 12, 1880. Dall & Bean.  
 28098 ♂ (Jaws, claspers, &c.). St. Michael's, 1876. L. M. Turner.

**114. *Raia batis* Pallas (not Linnæus).**

Aleutians, Kuriles, Kamtchatka (Pallas).

**SPINACIDÆ.**

**115. *Squalus acanthias* Linn.**

Santa Barbara, Monterey Bay, San Francisco, and Puget Sound  
 (Jordan & Gilbert).

- 6756 (Juv.). Sitka. F. Bischoff.  
 27663 ♂. Sitka Bay, June 9, 1880. S. Bailey.  
 28048 (Jaws). Sitka Bay, June 9, 1880. S. Bailey.  
 28049 (Jaws). Port Althorp, June 20, 1880. T. H. Bean.  
 27616. Off Marmot Island, July 8, 1880. Dall & Bean.

**PETROMYZONTIDÆ.**

**116. *Ammocætes aureus* Bean.**

- 21524 (Type). Anvik, Yukon River, 1877. L. M. Turner.  
 † 24045 (Juv.). Fort Yukon, 1877. L. M. Turner.

## APPENDIX.

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Most of the species named in this appendix are known to occur in waters bordering upon the limits of Alaska, and will doubtless be found by future investigators. To these are added certain others, described by Pallas, Tilesius, and Cuvier and Valenciennes, concerning which little is known, but which may yet fall into the hands of collectors in the region under discussion and become established elements of the Alaskan fauna.

### GASTEROSTEIDÆ.

1. *Gasterosteus aculeatus* L. var. *gymnurus* Cuv.  
Kamtschatka (Pallas, as *Gasteracanthus aculeatus*).

### PLEURONECTIDÆ.

2. *Pleuronectes pinnifasciatus* Steind. (De Castries Bay.)
3. *Pleuronectes Pallasii* Steind. (Kamtschatka.)
4. *Parophrys vetulus* Girard. (Puget Sound. Jordan & Gilbert.)
5. *Parophrys ischyurus* Jordan & Gilbert. (Puget Sound.)
6. *Pleuronichthys cœnosus* Girard. (Puget Sound. Jordan & Gilbert.)
7. *Hippoglossoides Jordani* Lockington. (Puget Sound. Jordan & Gilbert.)
8. *Hippoglossoides exilis* Jordan & Gilbert. (Puget Sound.)

### GADIDÆ.

9. *Gadus navaga* Kölreuter. (De Castries Bay. Steindachner.)
10. *Merlucius productus* (Ayres) Gill. (De Castries Bay. Steindachner, as *Boreogadus productus*.)

### CONGROGADIDÆ.

11. *Scytalina cerdale* Jordan & Gilbert. (Puget Sound.)

### LYCODIDÆ.

12. *Gymnelis* (?) *stigma* (Bennett) Gthr. (Kotzebue Sound. Lay & Bennett.)
13. *Zoarces elongatus* Kner. (De Castries Bay.)

### STICHÆIDÆ.

14. *Stichæus hexagrammus* var. Kner. (De Castries Bay.)
15. *Stichæus enneagrammus* Kner. (De Castries Bay.)
16. *Stichæopsis nana* Kner. (De Castries Bay.)

XIPHISTERIDÆ.

17. *Anoplarchus alectrolophus* (Pallas) Jordan & Gilbert. (Talek Island, Gulf of Penshin. Pallas, as *Blennius alectrolophus*.)
18. *Xiphister mucosus* (Girard) Jordan. (Puget Sound. Jordan & Gilbert.)
19. *Apodichthys flavidus* Girard. (Vancouver Island. Günther.)
20. *Apodichthys fucorum* Jordan & Gilbert. (Puget Sound.)
21. *Murænoides quinquemaculatus* (Kner.). (De Castries Bay. Kner, as *Centronotus quinquemaculatus*.)
22. *Murænoides fasciatus* (Bl. Schn.) Gill. (Amur River. Steindachner, as *Centronotus fasciatus*.)
23. *Murænoides tænia* (Pall.). (Kuriles. Pallas, as *Blennius tænia*.)
24. *Asternopteryx apus* (C. & V.). (Kamtschatka. Tilesius.)  
*Ophidium ocellatum* Tilesius *fide* Günther.  
*Blennius gunnellus* Pallas *fide* Günther.

ANARRHICHADIDÆ.

25. *Anarrhichas orientalis* Pallas. (Kamtschatka.)
26. *Anarrhichthys ocellatus* Ayres. (Puget Sound. Jordan & Gilbert.)

BLENNIIDÆ.

27. *Blennius* (?) *polyactocephalus* Pallas. (Kamtschatka.)  
Perhaps a species of *Carelophus*.
28. *Gunnellops roseus* (Pallas). (Kuriles. Pallas, as *Blennius roseus*.)

BATRACHIDÆ.

29. *Porichthys porosissimus* (C. & V.) Günther. (Puget Sound. Jordan & Gilbert.)

GOBIESOCIDÆ? *fide* Günther.

30. *Cyclopterus* (?) *Stelleri* Pallas. (Kamtschatka.)
31. *Cyclopterus* (?) *ventricosus* Pallas. (Kamtschatka.)

LIPARIDIDÆ.

32. *Careproctus gelatinosus* (Pallas) Gill. (Kamtschatka. Pallas.)

AGONIDÆ.

33. *Aspidophoroides inermis* Günther. (Vancouver Island.)
34. *Agonus* (?) *stegophthalmus* Tilesius. (Kuriles.)
35. *Agonus* (?) *lævigatus* Tilesius. (Sagalien Island.)
36. *Brachyopsis dodecaædrus* (Tiles). (Kamtschatka. Tilesius, as *Agonus-dodecaædrus*.)



37. *Brachyopsis rostratus* (Tiles.) Gill. (Kamtchatka. Tilesius, as *Agonus rostratus*.)

Kamtchatka and Kuriles (Pallas, as *Phalangistes fusiformis*.)

14936. Kamtchatka. Gordon Prince.

38. *Bothragonus Swanii* (Steind.) Gill. (Puget Sound. Steind., as *Hypsagonus Swani*.)

39. *Hypsagonus quadricornis* (C. & V.) Gill. (Kamtchatka. C. & V., as *Aspidophorus quadricornis*.)

14937. Kamtchatka. Gordon Prince.

## COTTIDÆ.

40. *Ascelichthys rhodorus* Jordan & Gilbert.

Puget Sound (Jordan & Gilbert).

15030. Victoria. Dall & Brown.

41. *Cottus quadricornis* Pallas (? not of Linnæus). Kamtchatka.

42. *Cottus mertensii* C. & V. Kamtchatka.

43. *Cottus jaok* C. & V. Kamtchatka.

44. *Cottus Brandti* Steind. (Amur River.)

45. *Cottus decastrensis* Kner. (De Castries Bay.)

46. *Cottus verrucosus* Bean.

27547 (Type). Plover Bay, Siberia, August 13, 1880. Dall & Bean.

47. *Cottus axillaris* (Gill.) Bean.

*Boreocottus axillaris* Gill.

24027 (Type). Avatcha Bay, Kamtchatka.

48. *Gymnacanthus claviger* (C. & V.). (Kamtchatka. C. & V., as *Cottus claviger*.)

49. *Porocottus tentaculatus* (Kner).

50. *Porocottus quadrifilis* Gill.

6227 (Type). Avatcha Bay, Kamtchatka. Wm. Stimpson.

27537. Plover Bay, Siberia, September 14, 1880. Dall & Bean.

51. *Megalocottus platycephalus* (Pallas) Gill.

Kamtchatka & America—(Pallas, as *Cottus platycephalus*.)

52. *Icelus hamatus* Kröyer.

27540 (Juv.). Plover Bay, Siberia, September 14, 1880. Dall & Bean.

27551 (Juv.). Plover Bay, Siberia, September 14, 1880. Dall & Bean.

53. *Artedius lateralis* Girard. (Puget Sound. Jordan & Gilbert.)

54. *Artedius pugettensis* Steind. (Puget Sound. Steind. & Jor. & Gilb.)

55. *Scorpenichthys marmoratus* Girard. (Puget Sound. Jor. & Gilb.)

## SCORPÆNIDÆ.

56. *Sebastichthys nigrocinctus* (Ayres) Gill.

Puget Sound (Jordan & Gilbert); Vancouver Island (Gill).

57. *Sebastichthys nebulosus* (Ayres) Gill.

Puget Sound (Jordan & Gilbert); Vancouver Island (Gill).

58. *Sebastichthys auriculatus* (Girard) Gill. (Vancouver Island. Gill.)

59. *Sebastichthys pinniger* (Gill.) Lockington. (Puget Sound. Jordan & Gilbert.)

60. *Sebastichthys mystinus* Jordan & Gilbert. (Puget Sound.)

#### FAMILY UNKNOWN.

61. *Ammodytes* (?) *septipinnis* Pallas. America.

#### EMBIOTOCIDÆ.

62. *Damalichthys argyrosomus* (Girard) Jor. & Gilb.

Puget Sound (Jor. & Gilb.); Vancouver Island (Gill).

63. *Ditrema Jacksoni* (Agassiz) Gthr. (Puget Sound. Jor. & Gilb.)

64. *Ditrema laterale* (Agassiz) Gthr. (Vancouver Island. Günther.)

65. *Ditrema brevipinne* Günther. Vancouver Island.

66. *Micrometrus aggregatus* Gibbons.

Puget Sound (Jor. & Gilb.); Vancouver Island (Günther).

67. *Micrometrus frenatus* (Gill.) Jordan & Gilbert.

Puget Sound (Jor. & Gilb.); Vancouver Island (Gill).

#### STROMATEIDÆ.

68. *Stromateus simillimus* (Ayres) Gill. (Puget Sound. Jordan & Gilbert.)

#### PERCIDÆ.

69. *Stizostedium vitreum* (Mitch.) Jordan & Copeland.

8469. North Red River. R. Kennicott.

8970. Athabasca Lake. R. Kennicott.

#### TRACHYPTERIDÆ.

70. *Trachypterus altivelis*? Kner. (Puget Sound.)

#### SCOPELIDÆ.

71. *Myctophum crenulare* Jordan & Gilbert.

Santa Barbara (Jor. & Gilb.).

23945. N. Lat. 49°, W. Long. 151°, September 15, 1871. W. H. Dall.

#### MICROSTOMIDÆ.

72. *Osmerus attenuatus* Lockington.

San Francisco (Jordan & Gilbert).

21587. Washington Territory. James G. Swan.

## COREGONIDÆ.

73. *Coregonus Artedi* (Le S.) Hoy.

Great Lake Region and Upper Mississippi Valley to Alaska (Jordan).  
I have seen no specimens of this species from Alaska. *C. laurette* resembles it but is quite distinct.

74. *Coregonus microstomus* (Pallas). (Kamchatka, &c.)75. *Stenodus Mackenzii* Richardson.

Mackenzie River with its tributaries (Rich.).

7262 (Skin). Fort Resolution, May 7. R. Kennicott.

76. *Thymallus vulgaris* (fide Günther).

*Salmo thymallus* Pallas (part). (Kamchatka.)

77. *Thymallus mertensii* C. & V. (Kamchatka.)

## SALMONIDÆ.

78. *Salmo curilus* Pallas. Kurile Islands.79. *Salmo leucomænis* Pallas. (? *Salvelinus malma* [Walb.] Jor. & Gilb.)

Kamtehatka and northward (Pallas).

80. *Salmo lævigatus* Pallas. Kurile Islands.

*Salmo lagocephalus*, *sanguinolentus*, *japonensis*, *lycaodon*, *proteus*, and *orientalis* of Pallas may doubtless all be reduced to the five species of *Oncorhynchus* now recognized from the Alaskan coast.

## PARALEPIDIDÆ.

81. *Paralepis coruscans* Jordan & Gilbert. (Puget Sound.)

## ENGRAULIDIDÆ.

82. *Stolephorus ringens* (Jenyns) Jordan & Gilbert.

Puget Sound (Jor. & Gilb.); Vancouver Island (Gill).

## NEMICHTHYIDÆ.

83. *Nemichthys avocetta* Jordan & Gilbert. (Puget Sound.)

## CONGRIDÆ.

84. *Conger* sp. (= *Muraena conger* Pallas). (Kamchatka.)

## ACIPENSERIDÆ.

85. *Acipenser transmontanus* Richardson. (Puget Sound. Jor. & Gilb.)

## RAIIDÆ.

86. *Raia rhina* Jordan & Gilbert. (Puget Sound.)87. *Raia fullonica* Pallas (not Linn.). (Kamchatka and Kuriles.)88. *Raia mucosa* Pallas. (Kamchatka.)

NOTIDANIDÆ.

89. *Hexanchus corinus* Jordan & Gilbert. (Puget Sound.)

CETORHINIDÆ.

90. *Cetorhinus maximus* (L.) Blainville. (Monterey Bay, Jor. & Gilb.)

GALEORHINIDÆ.

91. *Squalus carcharias* Pallas. (Kamtchatka.) ?(=*Eulamia lamia* [Risso] Gill.)  
San Diego (Jordan & Gilbert).

92. *Galeorhinus galeus* (L.) Blainville.  
San Diego to San Francisco (Jordan & Gilbert).

93. *Boreogaleus arcticus* (Faber) Gill. (Arctic Seas. Günther.)

94. *Carcharinus glaucus* (L.) Blainville. (Puget Sound. Jordan & Gilbert.)

SCYMNIDÆ.

95. *Somniosus microcephalus* (Bloch) Gill. (Puget Sound. Jordan & Gilbert.)

PETROMYZONTIDÆ.

96. *Petromyzon lampetra* Pallas (= *Petromyzon marinus* L. *vide* Günther).  
Okhotsk Sea (Pallas).

97. *Entosphenus tridentatus* (Richardson) Gill. (Columbia River. Jor. & Gilb.)

98. *Ammocetes plumbeus* (Ayres) Jor. & Gilb. (Puget Sound. Jor. & Gilb.)

99. *Ammocetes lumbricalis* (Pallas). (= *Petromyzon branchialis* L. *vide* Gth.)

Jenesei River and streams of Kamtchatka (Pallas).

SPECIES NOT YET FOUND ELSEWHERE THAN IN ALASKA.

(The numbers prefixed refer to my catalogue.)

8. *Pleuronectes quadrituberculatus*.

31. *Murænoides maxillaris*.

32. *Anarrhichas lepturus*.

45. *Cottus niger*.

46. *Cottus humilis*.

49. *Uranidea microstoma*.

50. *Gymnacanthus galeatus*.

55. *Melletes papilio*.

69. *Sebastichthys ciliatus*.

70. *Hexagrammus ordinatus*.

- 73. *Hexagrammus scaber*.
- 75. *Pleurogrammus monopterygius*.
- 79. *Ammodytes alascanus*.
- 80. *Dallia pectoralis*.
- 89. *Coregonus laurettæ*.
- 107. *Spratelloides bryoporus*.
- 109. *Ptilichthys Goodei*.
- 113. *Raia parmitera*.
- 116. *Ammocætes aureus*.

### FRESH-WATER FISHES COMMON TO ALASKA AND EASTERN NORTH AMERICA.

- 19. *Lota maculosa*.
- 81. *Esox lucius*.
- 73 (App.). *Coregonus artedi*. (Great Lakes.)
- 91. *Coregonus clupeiformis*. (Great Lakes.)
- 93. *Coregonus quadrilateralis*. (New Hampshire.)
- 95. *Salvelinus malma*. (New York, introduced from California.)
- 98. *Salmo irideus*. (Introduced from California.)
- 99. *Oncorhynchus chouicha*. (Introduced from California.)
- 108. *Catostomus longirostris*. (Vermont.)

### FISHES FOUND IN THE ARCTIC AND ALSO IN THE PACIFIC, SOUTH OF BERING STRAIT.

- 15. *Boreogadus saida*.
- 20. *Gymnelis viridis*.
- 23. *Stichæus punctatus*.
- 22 (App.). *Murænoides fasciatus*.
- 35. *Eumicrotremus spinosus*.
- 50. *Gymnacanthus pistilliger*.
- 52 (App.). *Icelus hamatus*.
- 59. *Triglops Pingelii*.
- 78. *Ammodytes americanus*.
- 85. *Mallotus villosus*.
- 95 (App.). *Somniosus microcephalus*.



SPECIES FOUND IN THE PACIFIC, SOUTH OF BERING STRAIT, AND ALSO IN THE ATLANTIC.

- 3. *Gasterosteus pungitius* subsp. *brachypoda*.
- 12. *Hippoglossus vulgaris*.
- 16. *Gadus morrhua*.
- 20. *Gymnelis viridis*.
- 23. *Stichæus punctatus*.
- 35. *Eumicrotremus spinosus*.
- 50. *Gymnacanthus pistilliger*.
- 52 (App.). *Icelus hamatus*. (N. lat. 53°. Collett.)
- 59. *Triglops Pingelii*.
- 64. *Hemitripterus americanus*.
- 78. *Ammodytes americanus*.
- 85. *Mallotus villosus*.
- 104. *Alepidosaurus ferox*.
- 115. *Squalus acanthias*.
- 95 (App.). *Somniosus microcephalus*.

ALASKAN SPECIES OCCURRING SOUTH TO SAN FRANCISCO OR BEYOND.

- 5. *Pleuronectes stellatus* Pall.
- 9. *Lepidopsetta bilineata*.
- 12. *Hippoglossus vulgaris* Flem.
- 13. *Atheresthes stomias* Jor. & Gilb.
- 14. *Pollachius chalcogrammus* (Pall.) Jor. & Gilb.
- 17. *Microgadus proximus* (Grd.) Gill.
- 53. *Hemilepidotus trachurus* (Pall.) Gthr.
- 65. *Sebastichthys maliger* Jor. & Gilb.
- 67. *Sebastichthys ruber* (Ayres) Lock.
- 68. *Sebastichthys melanops* (Grd.) Jor. & Gilb.
- 72. *Hexagrammus superciliosus* (Pall.) Jor. & Gilb.
- 74. *Hexagrammus decagrammus* (Pall.) Jor. & Gilb.
- 76. *Ophiodon elongatus* Grd.
- 77. *Anoplopoma fimbria* (Pall.) Gill.
- 78. *Ammodytes americanus* DeKay.

87. *Hypomesus pretiosus* (Grd.) Gill.  
 95. *Salvelinus malma* (Walb.) Jor. & Gilb.  
 96. *Salmo purpuratus* Pall.  
 97. *Salmo Gairdneri* Rich.  
 98. *Salmo irideus* Gibbons.  
 99. *Oncorhynchus chouicha* (Walb.) Jor. & Gilb.  
 100. *Oncorhynchus keta* (Walb.) Gill & Jor.  
 102. *Oncorhynchus kisutch* (Walb.) Jor. & Gilb.  
 103. *Oncorhynchus gorbuscha* (Walb.) Gill & Jor  
 106. *Clupea mirabilis* Grd.  
 110. *Acipenser medirostris* Ayres.

### ALASKAN SPECIES OCCURRING SOUTH TO COLUMBIA RIVER.

88. *Thaleichthys pacificus* (Rich.) Grd.  
 101. *Oncorhynchus nerka* (Walb.) Gill & Jor.

### ALASKAN SPECIES OCCURRING AS FAR SOUTH AS PUGET SOUND.

11. *Hippoglossoides elassodon* Jor. & Gilb.  
 16. *Gadus morrhua* L.  
 44. *Cottus polyacanthocephalus* Pall.  
 66. *Sebastichthys caurinus* (Rich.) Jor. & Gilb.  
 70. *Hexagrammus asper* Steller. (*Labrax Hexagrammus* Pall.)  
 33. *Bathymaster signatus* Cope.

### SYNOPSIS OF THE DISTRIBUTION OF ALASKAN FISHES.

	Atlantic.	Arctic.	Pacific south of Bering Strait.	Puget Sound.	San Francisco.
1. <i>Gasterosteus cataphractus</i> .....			+	+	+
2. <i>Gasterosteus microcephalus</i> .....			++	+	+
3. <i>Gasterosteus pungitius</i> subsp. <i>brachypoda</i> .....	+		++	+	+
4. <i>Aulorhynchus flavidus</i> .....			++	+	+
5. <i>Pleuronectes stellatus</i> .....		+	+		
6. <i>Pleuronectes glacialis</i> .....		++	+		
7. <i>Pleuronectes franklinii</i> .....		+			
8. <i>Pleuronectes quadrituberculatus</i> .....			+		
9. <i>Lepidopsetta bilineata</i> .....			+	+	+
10. <i>Linanda aspera</i> .....			+		
11. <i>Hippoglossoides elassodon</i> .....			+	+	
12. <i>Hippoglossus vulgaris</i> .....	+		+	+	+
13. <i>Atheresthes stomias</i> .....			+	+	+
14. <i>Pollachius chalcogrammus</i> .....			+	+	+

## Synopsis of the distribution of Alaskan fishes—Continued.

	Atlantic.	Arctic.	Pacific south of Bering Strait.	Puget Sound.	San Francisco.
15. <i>Borogadus saida</i> .....		+	+		
16. <i>Gadus morrhua</i> .....	+		+	+	+
17. <i>Microgadus proximus</i> .....			+		
18. <i>Pileia gracilis</i> .....			+		
19. <i>Lota maculosa</i> .....			+		
20. <i>Gymnelis viridis</i> .....	+	+	+		
21. <i>Lycodes Turnerii</i> .....			+		
22. <i>Lycodes coccineus</i> .....		+	+		
23. <i>Sticharus punctatus</i> .....	+	+	+		
24. <i>Sticharus</i> (?) <i>Rothrockii</i> .....		+	+		
25. <i>Lumpenus anguillaris</i> .....		+		+	+
26. <i>Xiphister rupestris</i> .....			+	+	+
27. <i>Xiphister chirus</i> .....			+	+	+
28. <i>Anoplocheilichthys atropurpureus</i> .....			+	+	+
29. <i>Muraenoides dolichogaster</i> .....			+		
30. <i>Muraenoides ornatus</i> .....			+	+	
31. <i>Muraenoides maxillaris</i> .....			+		
32. <i>Anarrhichas lepturus</i> .....			+		
33. <i>Bathymaster signatus</i> .....			+	+	
34. <i>Trichodon stelleri</i> .....			+		
35. <i>Eumicrotremus spinosus</i> .....	+	+	+		
36. <i>Liparis pulchellus</i> .....			+		+
37. <i>Liparis calliodon</i> .....			+		
38. <i>Liparis cyclopus</i> .....			+		
39. <i>Liparis gibbus</i> .....			+		
40. <i>Siphonognathus barbatus</i> .....			+		
41. <i>Podotheicus acipenserinus</i> .....		+	+	+	
42. <i>Podotheicus trispinosus</i> .....		+	+		+
43. <i>Cottus tenuiporus</i> .....		+	+		
44. <i>Cottus polyacanthocephalus</i> .....		+	+	+	
45. <i>Cottus niger</i> .....		+	+		
46. <i>Cottus humilis</i> .....		+	+		
47. <i>Aspidocottus bison</i> .....			+	+	+
48. <i>Ceratocottus diceraus</i> .....			+		
49. <i>Uranidea microstoma</i> .....			+		
50. <i>Gymnaeacanthus pistilliger</i> .....	+	+	+		
51. <i>Gymnaeacanthus galeatus</i> .....		+	+		
52. <i>Artedius notospilotus</i> .....		+	+	+	+
53. <i>Hemilepidotus trachurus</i> .....			+	+	+
54. <i>Hemilepidotus Jordanii</i> .....			+		
55. <i>Melletes papilio</i> .....			+		
56. <i>Leptocottus armatus</i> .....			+	+	+
57. <i>Oligocottus maculosus</i> .....			+	+	+
58. <i>Oligocottus globiceps</i> .....			+	+	+
59. <i>Triglops Pingelii</i> .....	+	+	+		
60. <i>Blepsias cirrhosus</i> .....			+	+	+
61. <i>Blepsias bilobus</i> .....			+		
62. <i>Nautichthys oculoasciatus</i> .....			+	+	+
63. <i>Ishamphocottus Richardsoni</i> .....			+		+
64. <i>Hemirhamphus americanus</i> .....	+		+		+
65. <i>Sebastichthys maliger</i> .....			+	+	+
66. <i>Sebastichthys caurinus</i> .....			+	+	+
67. <i>Sebastichthys ruber</i> .....			+	+	+
68. <i>Sebastichthys melanops</i> .....			+	+	+
69. <i>Sebastichthys ciliatus</i> .....			+		
70. <i>Hexagrammus asper</i> .....			+	+	
71. <i>Hexagrammus ordinatus</i> .....			+		
72. <i>Hexagrammus superciliosus</i> .....			+	+	+
73. <i>Hexagrammus scaber</i> .....			+		
74. <i>Hexagrammus decagrammus</i> .....			+	+	+
75. <i>Pleurogrammus monopterygius</i> .....			+		
76. <i>Ophiodon elongatus</i> .....			+	+	+
77. <i>Anoplopoma fimbria</i> .....			+	+	+
78. <i>Ammodytes americanus</i> .....	+	+	+	+	+
79. <i>Ammodytes alascanus</i> .....			+		
80. <i>Psychrolutes paradoxus</i> .....			+		
81. <i>Esox lucius</i> .....			+		
82. <i>Dallia pectoralis</i> .....			+		
83. <i>Osmerus dexter</i> .....			+		
84. <i>Osmerus spirinchus</i> .....		+			
85. <i>Mallotus villosus</i> .....	+	+	+		
86. <i>Hypomesus olidus</i> .....			+		
87. <i>Hypomesus pretiosus</i> .....			+	+	+
88. <i>Thaleichthys pacificus</i> .....			+		
89. <i>Coregonus lauretta</i> .....		+	+		

*Synopsis of the distribution of Alaskan fishes—Continued.*

	Atlantic.	Arctic.	Pacific south of Bering Strait.	Puget Sound.	San Francisco.
90. <i>Coregonus Merckii</i> var. ....	—	++	++	—	—
91. <i>Coregonus clupeiformis</i> .....	—	—	++	—	—
92. <i>Coregonus Kennicottii</i> .....	—	++	++	—	—
93. <i>Coregonus quadrilateralis</i> .....	—	++	++	—	—
94. <i>Thymallus signifer</i> .....	—	++	++	—	—
95. <i>Salvelinus malma</i> .....	—	+	++	—	—
96. <i>Salmo purpuratus</i> .....	—	—	++	+	+
97. <i>Salmo Gairdneri</i> .....	—	—	++	++	++
98. <i>Salmo irideus</i> .....	—	—	++	++	++
99. <i>Oncorhynchus chowicha</i> .....	—	—	++	++	++
100. <i>Oncorhynchus keta</i> .....	—	—	++	++	++
101. <i>Oncorhynchus nerka</i> .....	—	—	++	++	++
102. <i>Oncorhynchus kisutch</i> .....	—	—	++	++	++
103. <i>Oncorhynchus gorboscha</i> .....	—	+	++	+	+
104. <i>Alepidosaurus ferox</i> .....	+	—	++	—	—
105. <i>Alepidosaurus borealis</i> .....	—	—	++	+	—
106. <i>Clupea mirabilis</i> .....	—	—	++	+	+
107. <i>Spratelloides bryoporus</i> .....	—	—	++	—	—
108. <i>Catostomus longirostris</i> .....	—	—	++	—	—
109. <i>Pilichthys Goodii</i> .....	—	—	++	—	—
110. <i>Acipenser medirostris</i> .....	—	—	++	—	+
111. <i>Chimera Collieri</i> .....	—	—	++	+	+
112. <i>Raia binoculata</i> .....	—	—	++	+	+
113. <i>Raia parvifera</i> .....	—	—	++	—	—
114. <i>Raia batis</i> Pallas .....	—	—	++	—	—
115. <i>Squalus acanthias</i> .....	+	—	++	+	+
116. <i>Ammætes aureus</i> .....	—	—	++	—	—
52 (App.). <i>Icelus hamatus</i> .....	+	+	+	—	—
95 (App.). <i>Somniosus microcephalus</i> .....	+	+	+	+	—

**METHODS OF MAKING AND PRESERVING PLASTER CASTS.****By ANTHONY PIRZ.**

LONG ISLAND CITY, N. Y.,

October 28, 1881.

DEAR SIR: In using the method of preserving plaster casts with baryta water and soap as given some time ago, it happens that larger pieces remain damp a long time (years) and yellow iron spots readily appear on the plaster. V. Dechend, in Bonn, recommends brushing the casts with a hot saturated solution of borax twice, and larger pieces five to six times. Then apply twice a saturated and hot solution of chloride of baryta, and finally a hot solution of soap; the superfluous soap solution is to be washed off with hot water, and lastly with cold water. The whole treatment occupies but a few hours.

W. Reisig, in Darmstad, recommends covering the plaster casts with a solution of India rubber in benzole, or petroleum ether, or bisulphide of carbon. The casts so treated can be washed.

R. Jacobsen's plan to make plaster casts stand the washing is: to saturate the casts hot with a solution of a most neutral soap from soda lye and stearic acid in 10 parts of boiling water.

I. W. Platonoff, in Moscow, prepares a mass for casts as follows: take 50 parts glue, 35 parts wax, and 15 parts glycerine, with 30 per

cent. zinc oxide. It becomes as hard as horn. A softer mass consists of 50 parts glue, 25 parts wax, and 25 parts glycerine. To prepare the mass, dissolve the glue in warm glycerine, then add the wax, and lastly the metal oxide.

R. Martin, in Sonneberg, mixes 20 to 100 parts zinc oxide with 5 to 10 parts tartaric acid or calcined alum and 100 parts starch (finely powdered), and the required quantity of water to form the casts. If these articles are at a temperature below 15° Celsius and are poured in warm molds, the cast becomes brittle, but is at once made plastic by being placed in a water-bath of 50°. Then give the casts a surface which permits washing by collodion, which is mixed with a solution of wax in ether.

My method of preparing caustic baryta is: Take carbonate baryta, pulverize and mix with charcoal, put in a crucible well *luted* and expose in a white fire. Then leach with boiled water and let crystallize. As the caustic baryta so greedily absorbs the carbonic acid from the air, I give this simple cheap method, so that your department can often make the caustic baryta new, when the old has turned into carbonate baryta.

I have written these various methods and you can select what pleases you.

I shall be under great obligations to you, if you will send me the survey and publication when ready.

I remain, dear sir, yours very truly,

ANTHONY PIRZ.

Hon. SPENCER F. BAIRD,

*Secretary Smithsonian Institution, Washington, D. C.*

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**LIST OF FISHES COLLECTED BY LIEUT. HENRY E. NICHOLS, U. S. N., IN THE GULF OF CALIFORNIA AND ON THE WEST COAST OF LOWER CALIFORNIA, WITH DESCRIPTIONS OF FOUR NEW SPECIES.**

**By DAVID S. JORDAN and CHARLES H. GILBERT.**

The specimens of fishes collected by Lieut. Henry E. Nichols, commandant of the United States Coast and Geodetic Survey Steamer *Hassler*, in his voyage along the coast of Mexico and Central America, have been already noticed by us on page 225 of the present volume of the Proceedings of the United States National Museum. On the northward voyage of the *Hassler* (January–March, 1881), Lieutenant Nichols made another collection, also of much importance. A list of the species obtained, with their numbers as recorded in the register of the museum, is given below.

It will be noticed that all the species obtained from the west coast of Lower California belong to the Californian fauna, while nearly all of those obtained within the Gulf are members of the tropical fauna of the west coast of Mexico. It is a fact worthy of note that very few of the



fishes found along the southern coast of California extend their range as far southward as Cape San Lucas or Mazatlan. Only about ten species of shore fishes are known to occur both at San Diego and Mazatlan. In the region between San Diego and Magdalena Bay, the Californian fauna and its characteristic species almost wholly disappear, giving place gradually to the tropical fauna of the west coast of Mexico. Even the *Labridæ*, *Pomacentridæ*, and *Sciaenidæ* of California do not extend southward to Mazatlan.

A.—SPECIES FROM THE GULF OF CALIFORNIA.

29,377. *Serranus radialis* (Quoy & Gaim.) J. & G. Punta San Ignacio, Mexico.

29,388. *Mugil mexicanus* Steind. Same locality.

29,353, 29,353, 29,373. *Tetrodon politus* Ayres. Same locality.

29,362. *Cynoscion parripinne* Ayres. Guaymas, Mexico.

29,386. *Pomadasys ? inornatus* (Gill) J. & G. Guaymas, Mexico.

This specimen has 58 scales in a longitudinal series, the dorsal and anal fins almost naked, the anal rays III, 11, and the snout rather long, more than one-third length of head. It differs in all these respects from the description of *Pristipoma brevipinne* Steindachner = ? *Microlepidotus inornatus* Gill.

29,355. *Gerres californiensis* (Gill) J. & G. Guaymas, Mexico.

29,800. *Gerres gracilis* (Gill) J. & G. Guaymas, Mexico.

29,357. *Hemirhamphus unifasciatus* Ranzani. Guaymas, Mexico.

29,356. *Mugil brasiliensis* Agass. Guaymas, Mexico.

29,368. *Porichthys porosissimus* (C. & V.) Gthr. Gulf of California (dredged in 15 fathoms).

29,385. *Cynoscion othonopteron* sp. nov. Punta San Felipe, Mexico.

*Description*.—Body rather elongate, the back somewhat elevated, the profile from tip of snout to front of dorsal nearly straight; caudal peduncle rather long and slender, its depth 4 in head. Head long and pointed, compressed, not regularly conical. Mouth large, the lower jaw projecting; maxillary broad, reaching to or a little beyond posterior margin of orbit; premaxillaries in front on the level of lower part of pupil; length of gape  $2\frac{1}{3}$  in head. Teeth in upper jaw in a moderate band, which becomes narrower laterally; upper jaw with two small canines, their length scarcely one-fourth diameter of pupil; some of the other anterior teeth enlarged, and larger than the lateral teeth. Teeth in lower jaw in a narrow band in front, in a single series laterally; the lateral teeth much larger than the anterior. Eye moderate, broader than preorbital, narrower than maxillary; its diameter  $6\frac{2}{3}$  in head, a little more than half interorbital space. Preopercle with its membranaceous border broad, and covered with small scales. Gill-rakers long and strong, nearly as long as eye. Scales small, all with conspicuous membranaceous edges. All the fins excepting spinous dorsal completely covered with small scales, the bases of the fins thickened by

them; a few scales on front of spinous dorsal. Lateral line considerably curved anteriorly, becoming straight at a point in front of the vent, near the origin of the soft dorsal. Dorsal spines comparatively long and strong, little flexible; the third spine slightly longer than the second,  $2\frac{3}{4}$  in length of head; first spine short and slender, about  $\frac{1}{3}$  length of second. Dorsals not connected; second dorsal rather high, its longest rays  $3\frac{1}{2}$  in head. Caudal fin large, *lunate*, the outer rays about  $\frac{1}{3}$  longer than the middle rays, which are  $2\frac{1}{4}$  in head. (In *C. squamipinne* the caudal fin is rhombic, having the middle rays produced, much longer than the outer rays.) Anal large, as long as high, its distal margin perfectly straight; its longest rays about one-third length of head. Anal spines small, enveloped in the scaly skin, the second about  $\frac{1}{3}$  height of first soft ray. Anal fin terminating considerably in front of dorsal. Ventrals long, not reaching quite half way to vent, their length about half that of head. Pectorals broad, rather long, reaching a little beyond tips of ventrals, and contained  $1\frac{3}{4}$  in length of head. Head  $3\frac{1}{10}$  in length; depth 4. D. IX-I, 23; A. II, 10; Lat. l. 66 (pores 60).

Slaty bluish above, silvery below, with bright reflections; body and fins everywhere with dark punctulations; tip of chin dark; fins yellowish, the upper all with dark edging; pectorals blackish on the posterior side; the axil and the large axillary scale dusky; lower jaw bright silvery; lining of opercle dark; peritoneum pale.

A single large specimen, 23 inches long, was taken at Punta San Felipe, Mexico. Lieutenant Nichols notes that it is very abundant in that locality.

This species agrees with *C. squamipinne*, and differs from all other known species of the genus in the complete squamation of the fins.

29,366. *Stolephorus opercularis* sp. nov. Punta San Felipe.

Allied to *S. macrolepidotus* (Kner & Steindachner).

Body elliptical, rather short and deep, compressed, but not very strongly so, more elongate than in *S. macrolepidotus*; dorsal outline evenly curved; belly compressed, not trenchant. Apparently *not* translucent in life.

Head large, compressed, the snout bluntish, overlapping the lower jaw, the tip of which is just in front of the eye; maxillary comparatively short and slender, not extending backward to mandibular joint or to margin of preopercle. Maxillary with extremely fine, hardly perceptible teeth; mandible toothless.

Cheeks forming a triangular area, the apex downward and backward, the triangle lower and much broader than usual, the base (at the eye) being four-fifths the length of the other sides. Eye moderate,  $1\frac{2}{3}$  in length of cheeks, much longer than snout, 4 in head. Anterior ridge of preopercle prominent, the posterior membranaceous edge little conspicuous. Opercular region unusually long; distance from ridge of preopercle at lower posterior angle of cheeks backward to gill-opening

equal to distance from same point forward to middle of eye. Length of opercle, from anterior ridge of preopercle, three-fourths its greatest height.

Insertion of dorsal midway between base of caudal and middle of eye [caudal and dorsal fins nearly destroyed in type]; anal comparatively short and posterior, its insertion midway between gill-opening and base of caudal, its rays between 20 and 24 in number [two or three of the posterior rays destroyed by a string which has been tied around the tail in the type specimen]. Anal fin with a large scaly sheath. Ventrals small, inserted midway between base of caudal and front of eye. Pectorals short, not reaching ventrals.

Scales large, rather adherent [those on anterior part of body lost]; about 8 in a vertical series from last ray of dorsal to anal.

Head 3 in length; depth, 4. Anal rays about 23.

Color, bluish above; middle line of back dark; sides and below bright silvery, the cheeks and opercles especially so; no trace of lateral silvery stripe.

The type of this species, 5 inches in length, was taken from the stomach of a specimen of *Cynoscion othonopteron* at Punta San Felipe, Mexico. It has suffered somewhat from the digestive process, but the head is in perfect preservation, and all points essential to the description can be readily made out. This species seems to us most closely related, among described species, to *S. macrolepidotus*, from which it differs in very many respects.

29,372. *Caulolatilus princeps* (Jenyns) Gill. Punta Santa Teresa (in deep water).

29,370. *Balistes polylepis* Steind. Same locality.

29,382. *Opisthognathus rhomaleus* sp. nov. Santa Maria.

(Subgenus *Gnathypops* Gill; allied to *Gnathypops papuensis* Bleeker.)

Body rather robust, compressed; head very large, ovoid, thicker and deeper than body, with swollen cheeks, the occipital region high, the snout somewhat truncate, the intermediate profile forming a nearly even curve; greatest depth of head equal to its thickness and two-thirds its length. Eye not very large, 6 in head, longer than snout, about equal to the width of the flattish interorbital space.

Mouth large, the maxillary extending well beyond eye, but not to the margin of the preopercle nor to the mandibular joint, its posterior margin truncate; supplemental bone small, but distinct; length of maxillary from end of snout  $1\frac{3}{4}$  in head. Teeth moderate, in both jaws, in broad bands which become narrow on the sides; outer series of teeth somewhat enlarged, especially in upper jaw; one rather small, blunt tooth on middle of vomer. Gill-membranes scarcely connected.

Head naked. Scales on body small, smooth, somewhat imbedded; breast naked. Lateral line indistinct, ceasing opposite anterior third of second dorsal; 103 scales in a longitudinal series from head to caudal.

Dorsal fin high; a rather deep notch separating the spines from the soft rays; the longest spines 3 in length of head, more than half longer than the last spine, and scarcely lower than the soft rays. Insertion of dorsal opposite tip of the bony opercle, the opercular flap extending to opposite the third spine. Caudal fin rounded, about half length of head. Anal higher than soft dorsal, its longest rays  $2\frac{1}{4}$  in head. Ventrals large, close together, inserted in front of pectoral,  $1\frac{4}{5}$  in head. Pectorals short and broad,  $1\frac{1}{5}$  in head.

Head  $2\frac{7}{8}$  in length to base of caudal; greatest depth 4. Dorsal rays XI, 13; A. II, 13. Lat. 1, 103.

Color in spirits, olivaceous, slightly brownish above, scarcely paler below; everywhere more or less tinged and mottled with greenish. Head everywhere thickly and closely covered with small rounded dark brown spots, largest above and on cheeks, where they are about as large as pin's heads; smaller on lips and opercles; most thickly set on the anterior part of the head. Eye thickly spotted. Spots similar to those on the head extending along upper part of back, forming a vague band, which grows narrower backward and disappears opposite front of second dorsal; front side of pectoral and first three or four dorsal spines with dark spots. Dorsal dusky olive, with darker clouds, and with some dark spots, especially on the spinous part. Caudal and anal plain dusky or faintly marbled with paler; ventrals blackish, greenish at base; pectorals dusky green.

The single specimen obtained (29,382) is 16 inches in length, being unusually large for a member of this genus. It was taken with a hook in Santa Maria Cove, in Lower California.

29,358. *Mugil brasiliensis* Ag. Mulege, L. Cal.

29,359. *Muraena pinta* J. & G. (MSS.) Amortajada Bay, San Josef Island.

29,384. *Nematistius pectoralis* Gill. Pichelnogo, L. Cal.

29,380. *Sparus brachysomus* Lockington. Same locality.

29,378. *Fistularia serrata* Cuv. Same locality.

29,351. *Balistes polylepis* Steind. Cape San Lucas.

29,354. *Ophichthys callisoma* (Abbott) J. & G. Same locality.

This species is probably not identical with *Ophichthys triserialis* (Kaup) Gthr.

#### B.—SPECIES FROM THE WEST COAST OF LOWER CALIFORNIA.

29,371. *Umbrina roncadore* sp. nov. Pequeña Bay.

*Umbrina undulata* Steindachner, Ichth. Beiträge, iii, 21, 1875, and Denkschrift. Math-Naturw. Kais. Acad. Gesell. Wien, xli, 1879, 35 (reprint); not of Girard, whose type, examined by us, is a *Menticirrhus*.

*Umbrina xanti* Jor. & Gilb., Proc. U. S. Nat. Mus., 1880, 456, and 1881, 48 (not of Gill).

*Description*.—Body moderately elongate, the back somewhat elevated, the curve from the snout to the dorsal comparatively regular; the slope behind front of dorsal also regular, but less steep. Head conical, blunt-



ish, the snout considerably protruding; mouth moderate, horizontal, the maxillary extending to behind the pupil; eye moderate,  $1\frac{1}{2}$  in snout,  $5\frac{1}{2}$  in head; preopercle with its bony margin finely serrate; teeth in villiform bands, the outer row moderately enlarged in the upper jaw. Gill-rakers moderate, bluntish.

Spinous dorsal rather low, the fourth spine highest, about half the length of the head. Soft dorsal long and low, its membranes scaly. Caudal lunate, its upper lobe the longer. Anal small, the second spine rather strong,  $2\frac{2}{3}$  in head. Pectorals short and small, not reaching half way to vent and not nearly to tip of ventrals, their length two-thirds that of head.

Air-bladder well developed; pyloric cæca 8.

Head  $3\frac{1}{8}$  in length; depth  $3\frac{1}{3}$ ; D.X-I, 27; A. II, 7.

Lat. 1. with tubes on about 55 scales; about 60 scales in a longitudinal series.

Color bright silvery, bluish above, with some brassy reflections; sides with narrow, distinct, undulating stripes of deep olive running from the head and pectoral region upwards and backwards with some abrupt curvatures to along the base of the dorsal, those below the lateral line most undulated; usually between each pair of bands are some small olive spots, often forming regular series; no distinct vertical bars, faint cross-shades rarely present; cheeks clear white; lower fins yellow; upper fins and caudal plain clear brown; peritoneum and lining membrane of opercles chiefly black.

This species is the "Yellow-finned Roncador" of the California fishermen, and occurs in abundance along the coast of California from Santa Barbara to San Diego. Its southernmost record is the present one from Pequeña Bay.

It was formerly erroneously identified by us with the related species *Umbrina xanti* Gill (= *Umbrina analis* Günther), which takes its place to the southward (Cape San Lucas, Gill, to Tumbes, Peru, Steindachner.) Specimens numbered 26,758, 26,849, and 26,864, distributed by the U. S. Nat. Mus. in 1881, as *Umbrina xanti*, are all typical of *Umbrina roncadore*. (See Proc. U. S. Nat. Mus., 1881, 11.)

*Umbrina roncadore* closely resembles *U. xanti*, but is readily distinguished by the smaller scales (lat. 1. 45 to 50 in *U. xanti*), and by the color, *U. xanti* having broader and duller stripes, without the intermediate lines of dots. The peritoneum and lining of the opercle are paler in *U. xanti* and the body is deeper and less gracefully formed.

29,379. *Albula rufes* (L.) Goode. Pequeña Bay.

29,388. *Serranus nebulifer* (Grd.) Steind. Ascension Island.

29,375. *Harpe pulchra* (Ayres) J. & G. Ascension Island.

29,369. *Caulolatilus princeps* (Jenyns) Gill. Ascension Island.

29,365. *Scorpaena guttata* Grd. Ascension Island.

29,381. *Xenichthys californiensis* Steind. Cerros Island.

29,364, 29,352. *Harpe pulchra* (Ayres) J. & G. Guadalupe Island.



- 29,376. *Sebastodes auriculatus* (Girard) J. & G. San Martin Island.  
 29,361. *Sebastodes serriceps* J. & G. San Martin Island.  
 29,374. *Heterostichus rostratus* Grd. San Martin Island.  
 29,360. *Muraena mordax* Ayres.

INDIANA UNIVERSITY, November 15, 1881.

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ON THE GENERA OF CHITONS.

BY W. H. DALL.

PALÆOZOIC FORMS.

The long delay in preparing the illustrations for the monograph of the *Chitonidæ* by the late Dr. Philip P. Carpenter has been the occasion of several calls from paleontologists for an abstract of the genera adopted in his revision of the fossil species. In justice to Dr. Carpenter it seems that the characteristics of the genera should be made public, the material left by him on the Palæozoic species being practically complete and ready for printing. The Mesozoic and Tertiary chitons all belong to groups represented by living species, hence the present abstract relates solely to those of earlier date. The groups of recent chitons, already reviewed by me in these Proceedings,\* form the subject of the second more condensed abstract herewith.

The first fossil chiton was found by DeFrance in 1802, in the Eocene, and described by Lamarek as *Chiton grignoxensis*. It was only in 1834 that a second species, *C. antiquus* Conrad, was obtained, on this occasion from the Alabama Tertiary.

The first palæozoic chitons were found in the Carboniferous rocks of Tournay, in 1836, but they were not described until 1839. Since then numerous others have been brought together and described by various authors, as well as a number of organic remains not belonging to the *Chitonidæ* which have wrongly been referred to the group. Dr. Carpenter expended a large amount of time and money in examining the typical specimens in American and European museums, making several journeys for the purpose. His opinions, therefore, are entitled to great weight. Some time before his death, at his request, we went over the ground together, specimens and figures in hand, and the opinion then formed that his work is worthy of great respect, and, so far as facts are concerned, of entire confidence, has not been changed by my subsequent study of his incomplete manuscripts.

An excellent digest of the history of fossil chitons to date of publication was given by De Koninck in 1857,† which was translated for the Annals and Magazine of Natural History, of August, 1860, by W. H. Bailly.

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\*Vol. i, pp. 231-344, 1878.

†Bull. Acad. Roy. des Sciences de Belgique, 1857.

The characters for the groups herein described are due to Dr. Carpenter, and are given mostly in his own words. It will be observed that the groups named by others are restricted by him, by elimination of incongruous material included with the original types.

### HELMINTHOCHITON Salter.

*Helminthochiton* Salter (pars) § 1, Proc. Geol. Soc., 1846, pp. 49, 51, 52, fig. 6 (§§ 2, 3, and figs. 2, 3, exclus.).

Lorica leptoidea, elongata, regularis; muero ischnoideus; valvæ terminales laud sinuatae; apophyses ? (ignotæ).

*Helminthochiton* may be described as a greatly lengthened chitonous animal with the valves thin and angular, and perhaps without apophyses, though the negative evidence is not sufficient to establish so remarkable a departure from the type of the class in general. It differs from *Gryphochiton* in having the terminal valves regular, not sinuate, and in having a regular subcentral Ischnoid muero instead of the *Gryphaea*-like beak characteristic of the second section. It may be regarded as a Leptoid *Ischnoplax* with the valves thrown forward.

#### Species.

*Helminthochiton Griffithi* Salter, l. c., pp. 51, 52, fig. 6. Silurian of Ireland. (Type.)

*Helminthochiton priscoides*, Carpenter. Devonian of Vilmar; Schultze. (Mus. Comp. Zoölogy.)

### GRYPHOCHITON (Gray) Carpenter.

*Gryphochiton* Gray (pars.), P. Z.<sup>s</sup>, 1847, p. 70; no diagnosis.

Lorica regularis elongata; laminæ laterales nullæ, suturales parvæ, a sinu simplici lato separatæ; muero postice medianus, incurvatus; regio capitis et caudæ valde sinuata. Type *G. priscus* Munster.

*Gryphochiton* resembles a *Leptochiton* greatly drawn out and with the terminal valves more sinuated than has been observed in any recent *Chiton*.

#### Species.

*Gryphochiton priscus* Münster, Beitr. zur petr. kunde, 1, p. 38, fig. 4, 1839. Carboniferous of Tournay.

*Gryphochiton mepiscus* Ryckholt, Bull. Acad. Roy. des Sci. de Bruxelles, 1845, p. 48, no. 4, pl. 2, figs. 5, 6, 7, 8. Carboniferous of Tournay.

*Gryphochiton triangulatum* Carpenter, Ryckholt, l. c., pl. 2, figs. 4, 9, 10. Same locality.

*Gryphochiton verrucanus*, Ryckholt, l. c., p. 47, No. 3, pl. 1, figs. 7, 8, 9, 1845. Same locality.

### Subgenus CHONECHITON Carpenter.

Lorica leptoidea, valvæ centrales *Gryphochitoni* similes, projectæ; valva postica mucrone postico, infundibuliformi.

This bears the same relation to *Choneplax* which *Loricites* does to *Lorica*, i. e. similarity, except in the absence of laminæ of insertion. It may be described as a Leptoid *Choneplax*. In the recent shell the

funnel is formed by the laminae of insertion; as these do not exist in the leptoid section, the funnel is seen in the hollowing of the back of the valve itself.

*Type.*

*Chonechiton (Chiton) riseticola* Ryckholt, l. c., p. 51, no. 6, pl. 3, figs. 10, 11, 1845. Carboniferous of Visé, Belgium.

PRISCOCHITON Billings.

Leptochiton: lamina postica apicali, intus excavata.

*Type.*

*Priscochiton canadensis* Billings, Pal. Fos. Canada, 1865, p. 394, fig. 370. Lower Silurian.

PTEROCHITON Carpenter.

Lorica elongata, leptoidea; valvæ lateraliter excavatæ, projectæ postice acuminatæ; valva postica regularis, muerone ischnoideo; valva antica (plerumque?) sinuata; apophyses maximæ, sinu lato. Type *C. eburonicus* Ryckholt.

*Species.*

*Pterochiton eburonicus* Ryckholt, Bnll. l. c., part ii, p. 53, no. 8; pl. 4, figs. 7, 8,\* 1845. Carboniferous limestone of Visé, Belgium.

*Pterochiton legiacus* Ryckholt, Bull. l. c., p. 52, no. 7, pl. 4, figs. 5, 6, 1845; *Chiton gemmatus* (pars) Koninek, An. Fos. Carb. Belg., p. 323, no. 3, pl. 23, figs. c, d, e (not figs. a, b). Same locality as the preceding.

*Pterochiton gemmatus* (Koninek) Ryckholt, l. c., 1845, p. 59, no. 13, pl. 4, figs. 1, 2, 3 (fig. 4, forsitan exclus.). Same locality as preceding.

*Pterochiton Thomondiensis* Baily, Nat. Hist. Review and Quart. Journ. Sci., July, 1859, pl. 4, f. 2 a-c. Carboniferous limestone, County Limerick, Ireland.

*Pterochiton Sandbergianus* (?) Ryckholt, l. c., p. 62, 1845. Devonian, Vilmar; Schultze. (Mus. Comp. Zool.)

?? *Pterochiton Sluseanus* Ryckholt, l. c., p. 5, No. 10. (Non *C. Sluseanus* ejusdem, pl. 4, figs. 7, 8 = *eburonicus*.† Cf. text.)

Subgenus LORICITES Carpenter.

Related to *Helminthochiton* and to the recent *Lorica* as above stated. From the latter it differs in the absence of laminae of insertion.

Type *Chiton concentricus* Koninek, op. cit., 1857.

PROBOLÆUM Carpenter.

Lorica leptoidea, elongata, maxime projecta; valvis centralibus aræa centrales ante areas jugales porrectæ; valva antica sinuata, valva postica—? Type *C. corrugatum* Sandberger (pars).

Among recent forms this comes nearest to *Katherina*, but the difference is still extremely great.

\* The figures are wrongly named *C. Sluseanus* on the plate.

† Koninek does not escape this error also.

## Type.

*Chiton corrugatus* Sandberger fr., Verst. Rhein. Schicht. Nassau, p. 238, pl. 26, fig. 22 a, 1856, not figs. 22, 22 b, 22 c, 22 d = fish scales and valves of barnacles, as per typical specimens in Mus. Comp. Zoölogy, etc. Devonian of Vilmar.

## CYMATOCHITON Dall.

Valvis centralibus transversis, antice projectis, satis elevatis, jugo acutiore, lateribus planatis; apophysibus modicis, satis extantibus, valde distantibus; sinu jugali latissimo, incurrente; umbonibus extantibus, margine antico ad jugum valde postice sinuato. Type *C. Loftusianus* King.

This represents a *Leptochiton* with the valves thrown forward. It differs from *Probolium* in the valves being transverse instead of squared, and in the terminal valves being regular instead of waved. The name *Cymatodus* used in manuscript for this group by Dr. Carpenter is preoccupied by Newberry (1870).

## Species.

*Cymatochiton Loftusianus* King, Annals & Mag. Nat. History, I, vol. 14, p. 382; Kirkby, Proc. Geol. Soc., 1859, p. 607, 611, 615, pl. 16, figs. 31-41. Permian, Tunstall Hill, England.

*Cymatochiton Ryckholtianus* Koninck Mss. Types Mus. Comp. Zoöl. Carboniferous of Visé, Belgium.

? *Cymatochiton tornaticola*\* Ryckholt, l. c., p. 45, pl. 1, figs. 1, 2, 3, 1845. Carboniferous of Tournay.

? *Cymatochiton Scaldeanus*\* Ryckholt, l. c., p. 46, pl. 1, figs. 4, 5, 6, 1845. Same locality.

? *Cymatochiton Howseanus* Kirkby, Quart. Journ. Geol. Soc. 1857, p. 216, pl. 7, figs. 9-13. Permian, Tunstall Hill, England.

This last species is the first undoubted *Chiton* to put on features common to all the recent forms of the family.

Until the full record of his investigations is published, the amount of confusion as to types, discrepancies between figures and specimens, and errors of one kind and another discovered by Dr. Carpenter in his examination of the original types of many of the species can hardly be imagined. The synonymy is also necessarily left until the complete paper shall be printed. Meanwhile the student is warned that the citations herein actually made are the only ones which are guaranteed to relate to the species named, though there may be, and in most cases are, others which might be cited. The preceding (with synonyms) number all the Palæozoic chitons actually determined to be such up to 1873.

In the course of the investigation the following species have been found not to be chitons or chitonoid. They belong variously to fish scales, barnacle (*Turrilepas*) valves, ostracod crustacea, and some to undetermined organisms.

\* Doubt attaches to the molluscan nature of these two minute species, which have some crustacean features.

- "*Chiton*" *Grayanus* Koninek, 1857. Upper Silurian.  
 "*Chiton*" *Wrightianus* Koninek, ditto.  
 "*Chitonellus*" *Hancockianus* Kirkby, Proc. Geol. Soc., 1859, pl. 16, figs. 1-13. Permian, England.  
 "*Chiton*" *cordatus* Kirkby, ditto, figs. 24-29.  
 "*Chitonellus*" *distortus* Kirkby, ditto, figs. 28-30.  
 "*Chitonellus*" *antiquus*, Howse, Kirkby l. c., figs. 14-23. Permian.  
 "*Chiton*" *cordifer* Koninek, Deser. An. Foss. Terr. Carb. Belg., 1844, p. 324, pl. 22, fig. 5 a, b (teste Ryckholt). Carboniferous of Belgium.  
 "*Chiton*" *corrugatus* Sandberger (pars), p. 238, pl. 26, figs. 22, 22 b, 22 c, 22 d, 1856. Devonian and Lower Devonian of Vilmar and Ehrenbreitstein.  
 "*Chiton*" *sagittalis* Sandberger, l. c., p. 239, pl. 26, figs. 23 a, b. Same locality?  
*Salcochiton Grayi* Ryckholt, Journal de Conchyl., 1862, p. 259, pl. xii, f. 14. Carboniferous of Visé, Belgium.

# ABSTRACT OF ALL THE GENERA.

## Order POLYPLACIPHORA.

### Section I.—Chitones regulares.

Head and tail plates similarly articulated.

#### A. LEPTOIDEA.

Insertion plates obsolete or, if present, unslit.

(*Extinct forms.*)

- |                                   |                              |
|-----------------------------------|------------------------------|
| 1. <i>Helminthochiton</i> Salter. | 4. <i>Pterochiton</i> Cpr.   |
| 2. <i>Gryphochiton</i> Gray.      | a. ? <i>Loricites</i> Cpr.   |
| a. <i>Chonchiton</i> Cpr.         | 5. <i>Probolæum</i> Cpr.     |
| 3. <i>Priscochiton</i> Billings.  | 6. <i>Cymatochiton</i> Dall. |

(*Recent forms.*)

- |                              |                                       |
|------------------------------|---------------------------------------|
| 7. <i>Leptochiton</i> Gray.  | 9. <i>Hemiarthrum</i> Cpr.            |
| a. <i>Deshayesiella</i> Cpr. | 10. <i>Microplax</i> Adams and Angas. |
| 8. <i>Hantleya</i> Gray.     |                                       |

#### B. ISCHNOIDEA.

Insertion plates sharp, smooth, fissured; with eaves.

\*No pores on girdle.

- |                                     |                                      |
|-------------------------------------|--------------------------------------|
| 11. <i>Trachydermon</i> Cpr.        | 18. <i>Ischnochiton</i> Gray.        |
| a. <i>Trachyradsia</i> Cpr.         | a. <i>Stenoplax</i> Cpr.             |
| 12. <i>Callochiton</i> Gray.        | b. <i>Stenoradsia</i> Cpr.           |
| a. <i>Stereochiton</i> Cpr.         | c. <i>Ischnoplax</i> Cpr.            |
| 13. <i>Tonicella</i> Cpr.           | d. <i>Heterozona</i> Cpr.            |
| 14. <i>Schizoplax</i> Dall.         | e. <i>Ischnochiton</i> s. s. Cpr.    |
| 15. <i>Leptoplax</i> Cpr.           | f. <i>Ischnoradsia</i> Shuttleworth. |
| 16. <i>Chætoleura</i> Shuttleworth. | g. <i>Lepidopleurus</i> Cpr.         |
| a. <i>Mangerella</i> Cpr.           | h. <i>Lepidoradsia</i> Cpr.          |
| 17. <i>Spongiochiton</i> Cpr.       | 19. <i>Callistochiton</i> Cpr.       |

\*\*With girdlepores.

- |                              |                              |
|------------------------------|------------------------------|
| 20. <i>Callistoplax</i> Cpr. | 23. <i>Ceratozona</i> Dall.  |
| 21. <i>Angasia</i> Cpr.      | 24. <i>Pallochiton</i> Dall. |
| 22. <i>Newcombia</i> Cpr.    |                              |



## C. LOPHYROIDEA.

Insertion plates broad, pectinated, projecting backward.

- |   |  |
|---|--|
| 25. <i>Chiton</i> Linné.<br><i>a. Radsia</i> Gray.<br>26. <i>Tonicia</i> Gray.<br><i>a. Fannettia</i> Dall. | 27. <i>Eudoxochiton</i> Shuttleworth.<br>28. <i>Craspedochiton</i> Shuttleworth. |
|---|--|

## D. ACANTHOIDEA.

Insertion plates thrown forward.

\* Plates broad, pectinated (*A. lophyroidea*).

- |                              |  |
|------------------------------|--|
| 29. <i>Sclerochiton</i> Cpr. |  |
|------------------------------|--|

\*\* Plates sharp, grooved outside (*A. typica*).

- |   |  |
|---|--|
| 30. <i>Acanthopleura</i> Guilding.<br><i>a. Lucilina</i> Dall.<br><i>b. Corephium</i> Gray.<br><i>c. Francisia</i> Cpr. |  |
|---|--|

\*\*\* Plates sharp, smooth (*A. ischnoidea*).

- |  |   |
|--|---|
| 31. <i>Dinoplax</i> Cpr.<br>32. <i>Middendorfia</i> Cpr.<br><i>a. Beanella</i> Dall. | 33. <i>Nuttallina</i> Cpr.<br>34. <i>Arthuria</i> Cpr.<br>35. <i>Phacellopleura</i> Guilding. |
|--|---|

## Section II.—Chitones irregulares.

Tail plate abnormal or with a sinus behind.

## E. SCHIZOIDEA.

Tail valve fissured.

- |  |                               |
|--|-------------------------------|
| 36. <i>Lorica</i> H. and A. Adams.<br><i>a. Aulacochiton</i> (Shuttleworth) Cpr. | 37. <i>Schizochiton</i> Gray. |
|--|-------------------------------|

## F. PLACIPHOROIDEA.

Tail valve unslit, internally ridged, mucro nearly terminal.

- |   |  |
|---|--|
| 38. <i>Enoplochiton</i> Gray.<br>39. <i>Ornithochiton</i> Gray. | 40. <i>Placiphora</i> Gray.<br><i>a. Fremblya</i> H. Adams.<br><i>b. Euplaciphora</i> Shuttleworth.<br><i>c. Guildingia</i> Cpr. |
|---|--|

## G. MOPALOIDEA.

Tail valve with posterior sinus and one slit on each side.

- |  |  |
|--|--|
| 41. <i>Mopalia</i> Gray.<br><i>a. Placiphorella</i> Cpr.<br>42. <i>Katherina</i> Gray. | 43. <i>Acanthochiton</i> (Leach) Herrm.<br><i>a. Macandrellus</i> Cpr.<br><i>b. Stectoplax</i> Cpr.<br>44. <i>Notoplax</i> H. Adams. |
|--|--|

## H. CRYPTOIDEA.

With double sutural laminæ.

- |   |   |  |
|---|---|--|
| 45. <i>Cryptoconchus</i> Blainville.<br>46. <i>Amicula</i> Gray.<br><i>a. Amicula</i> s. s. Dall.<br><i>b. Chlamydochiton</i> Dall. | } | 47. <i>Cryptochiton</i> Gray and Middendorf. |
|---|---|--|

## I. CHITONELLOIDEA.

Tail plate funnel-shaped. Laminæ thrown forward.

- |  |   |   |
|--|---|---|
| 48. <i>Chitonellus</i> Blainville.<br><i>a. Cryptoplax</i> Gray. | } | 49. <i>Choneplax</i> Cpr.<br><i>a. Chitoniscus</i> Cpr. |
|--|---|---|

It is hardly necessary to observe that the names here ascribed to Gray, Shuttleworth, and other older writers are more or less restricted so as to make them natural assemblages, which most of them originally were not. The subdivisions under similar names to be found in Adams' Genera of Recent Mollusca and Chénu's Manual are nearly all heterogeneous assemblages. Some names which were found to have been preoccupied in other groups have been replaced by new ones. Nearly all the names enumerated have been made public, some of them many years ago, others by Dr. Carpenter in his "Table of Regular Chitons," distributed in November, 1873, but of which a large proportion of the copies printed are still on hand. Some appeared in different papers on mollusca of the northwest coast of North America, published by Dr. Carpenter from 1863 to 1874, and several were elucidated in a paper on the New England chitons in the Bulletin of the Essex Institute in 1873. A majority of them were also characterized by me (partly from Dr. Carpenter's manuscript) in my Report on the Limpets and Chitons of Alaska, &c., Proc. U. S. National Museum, December, 1878. Such as still remained unpublished are now included in the following analytical tables with additional notes elucidating their characters more fully.

It is believed that the publication of these tables will be beneficial in several ways, as in giving a general view of Dr. Carpenter's classification, and especially in calling attention to the characters which it is desirable should be distinctly noted by those who may describe new species of *Chitonidæ*, and for the want of which it is impracticable, in the majority of cases, to properly classify or even to subsequently recognize the species. The technical terms used and the relations of the several parts have been explained in my report above mentioned, and it is not considered necessary here to repeat the explanations.

The publication of the entire monograph only awaits the preparation of the illustrations, which has been delayed by circumstances entirely beyond the writer's control.

It may be thought by some who have not investigated the subject that the group has been unduly divided. In regard to the permanent

relations of its various genera, no dogmatism is justifiable at present or until the characters of a much larger number of species have been definitely determined. Until then, when the questions can be decided, the various subdivisions will at least serve a very useful purpose in calling attention to differences which otherwise might pass unnoticed or unheeded. For my own part, my impressions are that the majority of the genera or subgenera proposed by Dr. Carpenter will eventually be recognized as well founded, though a certain number may be condemned to consolidation.

#### NOTES ON THE GENERA.

6. *Cymatodus* Carpenter, MS., not of Newberry, 1870.

7a. Differs from *Leptochiton* not only in its hairy girdle, but also in its valves, which are thrown forward, forming a decided transition toward some of the palæozoic forms. Type *Leptochiton curvatus* Cpr. Okosiri, Japan; A. Adams.

10. *Microplax* Adams and Angas 1864, not of Lilljeborg, 1865.

12. *Callochiton* (restricted). Laminæ broken up into very numerous teeth rising out of spongy eaves, and having a tendency to become propped outside; sinus a mere wave in the united bodies of the sutural laminæ; mantle reticulated with peculiar bodies, the tips of which appear like diamond-shaped scales, and which are unlike the girdle-armature of any other Chiton. Example *Chiton larvis* of Montague, Pennant and Gray.

12a. Subgenus *Stereochiton*; *Callochiton*: zona coriacea sparsim lanuginosa. Type *Chiton castaneus* Wood, Ind. Test. et Gen. Conch.

15. Valvæ tenues in zona tenui, levi, partim immersæ; laminæ insertionis acutæ, terminales pauci-fissatæ, sed regulares; sinus haud dentatus; mucro medianus. Example, *Chiton coarctatus* Sowerby, Isle of Bohol.

17. Valvæ partim immersæ; laminæ acutæ, Ischnoidæ; sinus magnus levis; mucro medius planatus; zona spongiosa, antice producta. Example, *Spongiochiton productus* Cpr., New Zealand, Mus. Cuming, no. 50. This may be considered a partially covered *Chætopleura*, just as *Leptoplax* is a partially covered *Tonicella*.

20. Testa extus et intus ut in *Callistochitone*, zona porifera aliter nuda. Type *Chiton retusus* Sby. China Seas.

21. Testa extus et intus *Chætoplenroidea* sed subgrundis parvis; zona minutæ squamulopilosa, fasciculis ad suturas instructa. (= *Hanleyia* Ad. & Angas, non Gray). Type *A. tetrica* Cpr. Ceylon. Mus. Cuming, no. 83.

*Hanleyia variabilis* Ad. and Angas probably belongs to this group, but has not been dissected.

23. *Ceratophorus* Carpenter MS. (non Diesing, 1850). Valvæ extus et intus *Chætopleuræ* similis, sed dentibus suffultis, subgrundis curtis; zona levis, in cornua seu cornuum fasciculas circa suturas et marginem porrecta. Type *Chiton Guildingi* Reeve.

This differs from all other hairy or spiny Chitons, at all nearly related to it, in the mantle ornaments not being inserted into sockets, but being extensions of its substance.

24. (*Hemphillia* Cpr. MS., non Binney.) *Nuttallina*: zona lanugosa; laminæ centrales unifissatæ. This section unites in a form resembling *Nuttallina* some of the features of *Middendorfia*, from which the girdle differs in being spongy and covered with soft hairs instead of short shelly bristles. The shape is that of an *Ischnochiton*, the sculpture and girdle of *Chetopleura*, the insertion plates and sinus almost exactly like *Middendorfia*. Type *Pallochiton lanuginosus* Cpr. sp. Lower California.

26a. *Fannia* Gray, not Robineau Desvoidy, 1830.

29. Lorica Acanthopleuræ, zona Enoplochitoni similis; laminæ obtusæ, pectinatæ, sinus undatus, levis. Type *Sclerochiton* Cpr. Torres Straits. Mus. Cuming, no. 42.

Most like *Enoplochiton*, from which it differs in the articulation of the tail plate and the sub-central mucro.

30a. *Lucia* Gould, not of Swainson, 1833.

30c. Acanthopleura: valvis partim immersis, planatis; laminis centralibus pleurifissatis; sinu lobato. Type *Chiton spinosa* Brugiere.

This form bears the same relation to *Acanthopleura* that *Fannettia* does to *Tonicia*, with the additional peculiarity of Radsoid nicks in the central valves. Named for Dr. Francis, once editor of the *Annals and Magazine of Natural History*.

31. Lorica solidissima alata: mucro haud elevatus submedianus; laminæ valvæ separatæ, acutæ, leves; V. post. antice tendentes; sinus minimus; zona coriacea, fasciculatim spinulosa. Type *Chiton gigas* Chemnitz.

32. *Dawsonia* Cpr. (præc.) 1873; *Middendorfia* Cpr. in MS. later.) Lorica et zona extus ut in *Acanthopleura*; laminæ acutæ, extus rugosa, suffultæ; sinus planatus haud laminatus. Type *Chiton Polii* Philippi (non Deshayes), Dalmatia. Internally Ischnoid, externally Acanthopleuroid.

32a. (*Beania* Carpenter, not Johnstone.) Lorica et zona inter Acanthopleuram et Ischnochitonem intermedia; mucro submedianus; laminæ acuti, haud suffulti; zona squamis subspinosus striatis vix imbricata. Type *Chiton Rissoi* Cuming, non Payr. *C. pseudorissoi* Cpr. MS., Malta. Mus. Cuming, no. 51.

34. Lorica tenuis; valvæ undatæ; mucro posticus, productus, laminæ acutæ, leves; V. post. antice projectæ, sinus planatus, laminatus, levis; zona coriacea, levis, seu lanugata. Type *Arthuria filosa* Cpr., loc. incert. Mus. Cuming, nos. 23, 38.

This has the aspect of *Chetopleura* externally in sculpture, but has the tail plate like *Nuttallina* in its structure, and like *Placiphora* in its external appearance.

36a. *Aulacochiton* pars, Shuttleworth, 1853. Lorica: mucrone postico, parum sinuato; sinu lobato; zona squamulis minimis obsita, antice producta. Example, *Lorica Angasi* H. Adams, P. Z. S., 1864, p. 193. Australia.



40a. = *Streptochiton* Cpr. MS. Type *F. Collei* H. Adams. Australia.

40b. Placiphora: sinu lato, planato; zonæ setis hand fasciculatim instructis. Type *Chiton petholatus* Sowerby. South Australia.

40c. Placiphora: valvis partim immersis; zona postice emarginata. Type *G. obtecta* Cpr. New Zealand. Mus. Cuming, no. 45.

43a. *Acanthochiton*: valvis partim tectis; mucrone Ischnoideo; lam. postica rugosim lobata; ar. lat. depressis. Type *M. plumeus* Cpr. Hab.? Mus. Cuming, no. 108.

43b. *Acanthochiton*: valvis per duas trientes immersis. Type *S. porrecta* Cpr. Japan. Mus. Cuming, no. 97.

49. Animal repens, satis elongatum: valvæ expositæ parvæ, omnino contiguæ; valva postica infundibuliformis; mucro retrojectus, terminalis; laminæ ut in *Katherina* sed obsoletim fissatæ; zona *Acanthochitonoidea*. Type *Chiton strigatus* Sowerby. West Indies.

49a. Animal et testa *Choneplaxis* similes sed zona hand porifera.

Based on *Chitonellus striatus* and *strigatus* Sowerby, Conch. Ill., figs. 62 and 63, which are represented as without pores. In the former the valves are separated (as in *Notoplax*); in the latter they touch (as in *Choneplax*). The species need examination to confirm the accuracy of the figures, but it is probable that there are both pore-bearing and non-poriferous species among the vermiform as well as the compact *Chitonelles*. These last groups are the highest and most active in the whole order in tropical waters, as is *Cryptochiton* in the north.

TABLE I.

The following table will exhibit the minor characteristics of most of the recent Chitons in regard to the plan of the insertion plates, number of slits, if any, in anterior, middle and posterior valves; character of the tooth-like projections between the slits; and of the margin of the outer layer overhanging the insertion plates, termed *eaves* by Dr. Carpenter; all according to the numbers and letters of the preceding list:

× = many; ÷ = few; + = or more; \* = irregular.

No. of genus.	Plan of insertion plates.	Slits in valves.			Teeth.	Eaves.	Gills.
		Posterior.	Anterior.	Middle.			
(Leptoidea.)							
7	None .....	0	0	0	None .....	None .....	Short.
7a	do .....	0	0	0	None .....	None .....	Post.
8	Only in anterior valve .....	0	0	0	Rugose lamina .....	Minute .....	(?)
9	Present in anterior and posterior valves .....	0	0	0	Smooth lamina .....	do .....	Short.
10	Present in all valves .....	0	0	0	do .....	None .....	Short.
(Ischnoidea.)							
11	Regular, branching .....	x	x	1	Sharp, normal .....	Projecting, spongy .....	Med.
11a	do .....	x	x	2+	do .....	do .....	Med.
12	Minutely divided .....	x	x	2+	Propped outside .....	Broad, spongy .....	(?)
12a	do .....	x	x	5+	do .....	do .....	(?)
13	Regular, branching .....	x	x	1	Sharp, normal .....	Short .....	Med.
14	do .....	11	11	1	do .....	do .....	Subamb.
15	Regular, projecting .....	6	4	1	Sharp, long, thin .....	Minute .....	(?)
16	Regular, branching .....	x	x	1	Sharp, normal .....	Moderate .....	Amb.



x = many; ÷ = few; + = or more; \* = irregular.

No. of genus.	Plan of insertion plates.	Slits in valve.			Teeth.	Eaves.	Gills.
		Posterior.	Anterior	Middle.			
16a	Regular, branching .....	x	x	2+	Sharp, normal.....	Projecting.....	(?)
17	.....do.....	6	5	1	Sharp, long, smooth..	Minute.....	(?)
18a	.....do.....	x	x	1	Sharp, normal.....	Projecting.....	Amb.
18b	.....do.....	x	x	2+	.....do.....	.....do.....	Amb.
18c	.....do.....	8	10	1	.....do.....	.....do.....	Amb.
18d	.....do.....	11	11	1	.....do.....	.....do.....	Amb.
18e	.....do.....	x	x	1	.....do.....	.....do.....	Amb.
18f	.....do.....	x	x	2+	.....do.....	Projecting, long	Amb.
18g	.....do.....	x	x	1	.....do.....	.....do.....	Amb.
18h	.....do.....	x	x	2+	.....do.....	.....do.....	Amb.
19	.....do.....	x	x	1	Excurred, plumate....	.....do.....	Amb.
20	.....do.....	x	x	1	Excurred, solid.....	Projecting.....	(?)
21	.....do.....	x	5	1	Rough, propped.....	Short.....	(?)
22	.....do.....	x	x	1	Solid, not propped....	.....do.....	(?)
23	.....do.....	x	x	1	Solid, propped.....	.....do.....	(?)
24	.....do.....	8-10	8-9	1	Sharp, curved.....	Short, spongy....	Med.
(Lophyroidea.)							
25	Regular, branching .....	x	x	1	Blunt, serrate.....	Short, spongy....	Amb.
25a	.....do.....	x	x	2+	.....do.....	.....do.....	Amb.
26	.....do.....	x	x	1	Sharper, serrate.....	.....do.....	Amb.
26a	.....do.....	9	9	1	Sharper, serrate, long	Very short.....	Amb.
27	Unfissured.....	*	*	*	Blunt, fimbriate.....	Short.....	(?)
28	Regular.....	8	5	1	(?).....	(?).....	(?)
(Acanthoidea.)							
29	Regular, branching .....	x	x	1	Blunt, grooved.....	Projecting, grooved.	(?)
30	.....do.....	x	x	1	Longer, grooved.....	.....do.....	Amb.
30a	.....do.....	x	x	2+	.....do.....	.....do.....	(?)
30b	.....do.....	0	x	1	.....do.....	.....do.....	Amb.
30c	.....do.....	10	15	2+	.....do.....	Very short.....	(?)
31	.....do.....	10	10	1	Long, smooth.....	Moderate, not grooved.	(?)
32	.....do.....	8	9	1	Propped, smooth.....	Moderate, spongy	(?)
32a	.....do.....	9	9	1	Short, sharp, smooth..	Projecting.....	(?)
33	V. all thrown forward....	7-8	10	2	Very long, sharp, smooth.	Short.....	Amb.
34	V. post. thrown forward....	9+	10	1	Normal, sharp, smooth.	Moderate.....	(?)
35	.....do.....	6+	5	1	Very long, sharp, smooth.	Very short.....	Amb.
(Schizoidea.)							
36	{ Regular, posterior valve {	0	x	1	Blunt, rugose.....	Moderate.....	(?)
36a	{ slit between 2 ridges. {	0	x	1	Sharp, serrate.....	Long.....	(?)
37	Str. forward, deep slit....	+	x	1-2	Sharp, long.....	Small.....	Med.
(Placophoroidea.)							
38	Str. forward, flat behind....	0	x	1	None behind.....	Deeply furrowed	(?)
39	Regular, flat behind.....	0	x	1	Normal, serrate.....	Moderate.....	(?)
40	Regular, ribbed behind.....	0	x	1	Slightly propped.....	Small.....	Amb.
40a	.....do.....	0	x	1	Excurred.....	.....do.....	(?)
40b	.....do.....	0	x	1	Sharp.....	Minute.....	(?)
40c	.....do.....	0	x	1	Sharp, very long, smooth.	.....do.....	(?)
(Mopaloidea.)							
41	{ Regular, posterior valve {	1	8+	1	Long, propped.....	Minute.....	Med.
41a	{ laminated.....	1	x	1	Mod. simple.....	Small.....	(?)
42	Thrown forward, laminated	*	7	1	Very long, propped....	Minute, spongy....	Amb.
43	.....do.....	1	5	1	Long, sharp, smooth	Small.....	Med.
43a	Thrown forward somewhat.	*	5	1	Very long, sharp, smooth.	Minute.....	(?)
43b	Thrown forward much.....	1	5	1	Very long, sharp, rugose.	.....do.....	(?)
44	Tail plate crenate behind...	2	5	1	Crenate, sharp, smooth.	.....do.....	Long.
(Cryptoidea.)							
45	Regular, behind variable....	*	5	1	Very long, smooth....	Minute.....	1/2.
46a	Mopaloïd.....	2	6	1	.....do.....	.....do.....	Med.
45b	.....do.....	2	5	1	.....do.....	.....do.....	Amb.
47	Coarsely mopaloïd.....	2	5	1	.....do.....	None.....	Amb.
(Chitonelloidea.)							
48	Very sagittate.....	0	5	0-1	{ Very short, except {	Distinct.....	Post.
48a	.....do.....	0	5	0	{ at sutures.....	.....do.....	Post.
49	Intermediate.....	1	5	1	Mod. long in front....	Minute.....	(?)

TABLE II.

This table enumerates in brief the characters of the sinus of the girdle and its armature, and the chief distinctive peculiarities of each group.

No. of genus.	Sinus.	Girdle.	Peculiarities.
7	Simple, smooth, deep .....	Gravelly scales, smooth or striated	All negative.
7a	Simple, broad .....	Spicules and chaffy scales .....	Flattened mucro, valves thrown forward
8	Simple, broad, shallow .....	With hairs or fine spines .....	Laminae only on anterior valve.
9	Broad, spongy .....	Solid, downy, poniferous .....	Terminal valves laminated.
10	Obsolete .....	Thin, horny, finely granulous .....	Unslit laminae on all valves.
11	Broad, shallow .....	Granular flattish scales .....	Short gills, granular scales.
11a	do .....	do .....	Radsoid central slits.
12	Extremely small .....	Long, horny scales .....	Small sinus, reticulate girdle, crowded propped teeth.
12a	Most minute .....	Smooth, downy .....	Smooth girdle.
13	Broad, shallow .....	Smooth or downy .....	Short gills, ischnoid plates.
14	Broad, fissured .....	Smooth .....	Valves slit in dorsal axis.
15	Moderate .....	Thin, smooth .....	Teeth few, valves partly immersed.
16	Broad or minute .....	Hairy .....	Ischnoid plates, hairy girdle
16a	Broad, smooth .....	Short, striated, shelly bristles ..	Radsoid slits ischnoid plates, striated bristles.
17	Simple, broad, deep .....	Spongy, downy .....	Half immersed valves, plates ischnoid.
18a	do .....	Irregular, chaffy scales .....	Body long, chaffy scales.
18b	do .....	do .....	Same as last, with radsoid slits.
18c	Simple, narrow, deep .....	Long, striated spines and scales ..	Same, triple series of striated scales.
18d	Simple, broad, shallow .....	Double series scales, not chaffy ..	Body normal, double series of scales.
18e	do .....	Small, transverse scales .....	Body normal, small striate scales.
18f	do .....	do .....	Body normal, radsoid slits.
18g	{ Broad, shallow, some- times dentate. }	Large, smooth, imbricated scales ..	{ Scales of <i>Chiton</i> , plates of <i>Ischno- chiton</i> . Same, with radsoid slits.
18h			
19	Broad, shallow, laminate ..	Narrow, with small scales .....	Narrow girdle, highly sculptured, plates curved outward
20	Narrow, deep, laminate ..	Smooth, with marginal tufts .....	Curved plates, marginal pores.
21	Narrow, shallow, simple ..	Minute bristles and sutural hair- tufts .....	Propped teeth, sutural pores.
22	Rounded, simple .....	Fleshy with long, hairy bristles ..	Tough, fleshy girdle, propped teeth.
23	Narrow, shallow, simple ..	Smooth, with horny processes .....	Propped teeth, horny girdle processes.
24	Broad, shallow, simple .....	Spongy, with scattered soft hairs ..	Spongy girdle, single lateral slits.
25	Squared, denticulate .....	Large, solid, imbricate scales .....	Broad serrated teeth and sinus, scaly girdle.
25a	do .....	do .....	Same, with added side slits.
26	do .....	Smooth or downy .....	Sharper teeth, smooth girdle.
26a	do .....	Smooth, spreading .....	Sharper teeth, valves partly covered.
27	Small, laminae united .....	Hairy .....	Non-fissured but deeply pectinate teeth, hairy girdle.
28	(?) .....	"Minutissime asperulus" .....	Posterior valve "medio fimbriata."
29	Large, laminae united .....	Large, solid, grooved scales .....	Non-imbricate scales, broad grooved and serrate teeth.
30	Large, waved, laminae united.	Shelly bristles .....	Teeth short inside, long outside, waved sinus.
30a	(?) .....	do .....	Same, with radsoid slits.
30b	{ Large, waved, lobed, lam- inae united. }	{ Shelly spines .....	{ Spinous girdle, lobed sinus. Partly covered valves, radsoid slits.
30c			
31	Minute, waved, smooth .....	Smooth, small, downy tufts .....	Downy girdle tufts, smooth sharp teeth.
32	Simple, laminae separated ..	Granular bristles .....	Bristly girdle, smooth propped teeth.
32a	do .....	Bristly, striated scales .....	Sharp teeth, striate scales.
33	do .....	Broad, with shelly bristles .....	Long, sharp teeth, radsoid slits, posterior mucro.
34	Narrow, smooth, laminate ..	Thin, lanugate .....	Twisted mucro, smooth, thin girdle, thin ischnoid valves.
35	Narrow, laminae separated ..	Thin, lanugate, wide, with sutural pores.	Smooth, porous girdle partly covering valves, very long teeth.
36	Narrow .....	Slit behind, solid smooth scales ..	Slit tail-plate, scaly girdle.
36a	Narrow, lobed .....	Produced in front, upright scales ..	Sharp teeth, produced girdle, bilobed scales, lobed sinus.
37	Narrow, very deep .....	Slit behind, minute spicule .....	Very long and narrow, deep slit.
38	Deep, lobed .....	Large, separate scales, bristles between.	Scaly girdle, flattened tail plate.

TABLE II—Continued.

No. of genus.	Sinus.	Girdle.	Peculiarities.
39	Moderate, lobed.....	Chaffy hairs.....	Hairy girdle, glossy valves, flattened tail-plate.
40	Small, sut. laminae joined..	Hairy, with regular pore-tufts...	Rows of pore tufts, swollen ribs.
40a	Broad, shallow.....	do.....	Outbending of the teeth.
40b	Broad, deep, spongy.....	Crowded hairs without pores...	Hairy girdle without pores.
40c	do.....	Encroaching on valves pore-tufts	Valves partly covered.
41	Very narrow.....	Hairy, often slit behind.....	Normal shape, sharp laminae with one slit, waved behind.
41a	do.....	Regular pores, much produced in front.	Same, with small pores.
42	Deep, broad, spongy.....	Smooth, valves nearly covered...	Smooth, broad girdle, teeth thrown forward.
43	do.....	Hairy, with long, fasciculated spiculae.	Tufted girdle, large laminae, minute tail plate.
43a	Moderate.....	Smoothen, with tufts.....	Valves partly covered, sunken side areas, lobed tail-plate.
43b	Shallow, broad.....	Hairy, with tufts.....	Valves nearly covered, tufted girdle.
44	Deep, narrow.....	Crowded spicules, with sutural pores.	Valves separated with narrow sinus.
45	Deep, arched.....	Smooth, tufted, valves nearly covered.	Arched, nearly covered valves, tubercular pores near jugum.
46a	Broad.....	Smooth, irregularly tufted.....	Tips of valves only exposed, soft bristles irregularly disposed, short gills.
46b	do.....	Coriaceous, irregularly tufted...	Same, with ambient gills.
47	Deep.....	Covering the shell, with numerous fine spiculae in tufts all over the surface.	Valves entirely covered.
48	Very deep and narrow.....	Crowded bristles, no tufts.....	Very long, hind valves separate.
48a	do.....	Crowded bristles, with tufts.....	Same, with small tufts.
49	do.....	Gravelly, with sutural tufts.....	Side tufts, valves touching.

With the above data and those comprised in my report on the Limpets and Chitons of Alaska, &c., students should be pretty well able to refer any Chiton of whose characters they have made themselves masters to its proper place in the general classification.

NOVEMBER 30, 1881.

NOTES ON CERTAIN ABORIGINAL SHELL MOUNDS ON THE COAST  
OF NEW BRUNSWICK AND OF NEW ENGLAND.

BY S. F. BAIRD.

During several successive visits made to New England and the Provinces, I embraced the opportunity of examining a number of interesting shell mounds, intending to continue the research and to prepare a detailed account of them. Subsequent events, however, have prevented my doing this, and I now publish some fragmentary notes on the subject, for the purpose of calling attention to the localities and inviting further examination.

In general, it is possible to determine beforehand the existence of shell heaps by the physical surroundings. Thus, whenever on the sea-coast the shore sloped gently to the south, with fresh water in the neighborhood, shell mounds or beds could always be inferred, especially if in the vicinity of flats where clams could be obtained. Here were generally established the sites of villages or of temporary encampments.

Prof. F. W. Putnam, in one of his papers upon shell mounds in New England, has remarked upon the comparative absence of stone implements therein. This I did not find to be the case in Maine and New Brunswick; indeed, in some cases, the abundance was quite remarkable.

The examinations of the shell beds in New Brunswick and Eastern Maine were mostly made in the summer of 1869; of those on Cape Cod, in 1870 and 1871; and of those on Casco Bay, in 1873. All the specimens collected are in the National Museum at Washington.

No. 1.—*Oak Bay, St. Croix River, St. David's Parish, New Brunswick.*—This locality is on the eastern side of Oak Bay, and is about eight miles from Calais, on the farm of Josiah Simpson. This is the most extensive and in fact one of the richest mounds I have ever examined. The total thickness of the bed is about 5 feet, and the different layers occur in a succession indicated in the accompanying diagram.

A striking feature in this mound is the abundance of spines and shells of *Echini*, which evidently constituted a large portion of the food of the aborigines. A careful examination of the ashes indicated that they were derived, for the most part, from eel-grass (*Zostera marina*), and it is suggested that the cooking of the shells was done by wrapping them up in dry eel-grass and setting fire to it. This would probably cook the animals sufficiently to enable them to be readily withdrawn from the shell.

Oak Bay is a narrow fjord, extending northward from Passamaquoddy Bay, the water being entirely salt. The tides are very high, and a vast extent of flats is exposed at low water, still abounding in the soft clam.

The area of the shell bed appears to be about one acre. The principal shells are the following:

*Buccinum plicosum.*

*Natica heros.*

*Pecten tenuicostatum.*

*Pecten cardium*

*Mya arenaria.*

*Mytilus.*

*Helix alternata.*

VERTICAL SECTION OF SHELL HEAP, OAK BAY, NEW BRUNSWICK, SEPTEMBER, 1869.  
[Scale  $\frac{1}{16}$ .]

6 in.	Top sod, fine powdery humus.	1.
6 in.	Much decomposed clam shells.	2.
3 in.	Fine flat gravel—Ancient beach.	3.
3 in.	Finely comminuted shells: carbonaceous matter.	4.
3 in.	Clayey humus, nearly pure.	5.
4 in.	Fine shells, white ashes, carbonaceous matter.	6.
4 in.	Finely comminuted shells, carbonaceous matter.	7.
6 in.	Shells.	8.
2 in.	Layer of <i>Echinus</i> spines.	9.
3 in.	Black bed.	10.
8 in.	Shells.	11.
3 in.	Blackish matter.	12.
	Original clay.	13.



Several visits were made to Oak Bay in company with George A. Boardman and Dr. Todd, of St. Stephen's, New Brunswick.

No. 2.—*Cobscook Bay, Washington County, Maine; Farm of Levi Halliwell.*—This point was reached by water from Eastport, Me., and is five miles south of Denysville. It is on a narrow, sloping point, running sharply into the bay and cut away at the water's edge. The surface is about 6 feet above the level of high tide. The edge has been much worn away by the water, and probably at one time extended considerably beyond its present position. The shells were much broken in the beds. The abundance of roots of trees rendered digging very difficult. The shells formed a layer of from 6 to 20 inches below the surface of the sod. Bones were very abundant, especially those of the moose and beaver. Stone arrows and flint flakes, &c., were also very numerous. The area of the bed is about 30 feet by 20, and gives rise to a decided swell in the slope. At other points in the neighborhood there are thin seams of shells in the sod, much mixed with charcoal and black earth, without any bones. I made several visits to this locality, and a more extended exploration was made by Mr. Gardiner, of Eastport, who presented his collections to the National Museum.

No. 3.—*Cobscook Bay, Washington County, Maine; South Bay, at the southern end of Long Island.*—This bed is at some distance from the water and was not very productive. It is situated on a high bank, sloping gradually to the water, and terminating abruptly. Much of it has been washed away. There appears to have been one continuous layer, covering about 30 or 40 feet by 20 with outlying hummocks. The sod is five or six inches thick, succeeded by a bed of large unbroken shells, with little or no dirt within eight or ten inches of the top. A few stone arrows were obtained here, but not many bones—none to warrant further exploration.

No. 4.—*Grand Menan, New Brunswick; Grand Harbor*—Grand Menan is situated about 20 miles from Eastport. This was found to contain many deposits of small shell heaps; no beds, however, were very extensive. Those at Newton's Point and Ingall's Head, in Grand Harbor, were found to be the most productive localities.

The shells were much broken and mixed with dirt. Where the bed reached the water's edge it was about 40 feet wide and 10 inches thick. The only mammals observed were seals, some beaver, many bones of birds and a few of fishes were obtained. Stone articles were abundant; many arrows, flint flakes, &c. A few worked bones of the beaver were secured.

No. 5.—*Grand Menan; Nantucket Island.*—This is the residence of Simeon L. Cheney, the well known naturalist of Grand Menan, whose assistance to many American naturalists has been so often gratefully acknowledged.

No. 6.—*Grand Menan, Cheney Island, near Whitehead Island.*—The shells in the last two localities occur on the south side of the island in detached heaps or hummocks, containing each from half a bushel to three or four bushels, not connected by any layers. They are usually high up

in the field and covered with thick sod. These heaps show very few bones, and very seldom any stone implements. They appear to have been casual in their origin, and do not mark long continued settlements.

Cormorant bones were found quite abundantly in the Nantucket Island heaps. There appeared to be an unusual scarcity of bones of fishes in the Grand Menan deposits, and those chiefly of small fishes, such as sculpins, and the like. Bones of codfish, and perhaps even of goose-fish, and other large fish were more common at Eagle Hill, Ipswich, where the mounds, while abounding in the bones of fish, furnished very few of mammals and birds.

No. 7.—*Pope Logan, Lepreau Bay.*—The locality visited is on Holland's farm, on the north part of the island and west of the westernmost saw-mill. Of the numerous deposits in the vicinity only one was examined; this revealed an abundance of shells of the soft clam (*Mya arenaria*), still found in numbers in the neighborhood, the locality being celebrated all along the coast in this respect.

The shell heap examined is on a sloping bank descending to the south, the lower end being about 10 feet above high tide, and occupying an area of 150 feet by 50, and having a depth of 20 feet in the several layers. The shells were, for the most part, entire and unstratified, with very little mixture of earth. The bones of large mammals, such as the moose, and probably the caribou, were extremely abundant, occurring by the cart-load. They were much less broken up than usual.

No. 8.—*Bliss's Island, New Brunswick.*—This locality is situated near the head of the bay on the right hand of Pentlow's Cove, to the southwest. Here the shells occur in thin, compact layers on the bank facing the northwest, much mixed with black dust. The deposit is scanty and scarcely worth working.

No. 9.—*Bliss's Island, Fisherman's Cove, New Brunswick.*—This locality is on the northeast side and north of the weirs. Here the shells occur unstratified in a bed about 20 inches thick, almost free from mixture, and covered with a light, loose soil, 6 to 10 inches deep. Very few bones were found.

No. 10.—*Frye's or Cailiff's Island, New Brunswick.*—This bed was one of the richest I have ever examined. It is situated on English Cove, directly opposite Bliss's Island, to the east of Long Point. It is near the farm buildings, between two willows. Here the shell bed was a very large one, about 15 feet above the present high tide, and seems to have been torn up by the tide and restratified by the water, so that articles of the same kind and specific gravity were usually found in association. The layers consisted of black beach gravel, alternating with nearly pure gravel. The total bed was from 20 to 30 inches thick, the productive layers occupying only a few inches of it. The shells had been cast in strata on either side of a ravine or gulch, along the bottom of which there were but few shells, but containing nearly all the bones and stone implements of the original bed mixed with gravel. West of this locality is another bed at a lower level than the first.

I am much indebted to Mr. Henry Frye, of St. George, New Brunswick, for permission to examine this locality, the scientific interest of which he appears fully to appreciate.

No. 10A.—*East side of Digidequash River, Passamaquoddy Bay, New Brunswick.*—Not very productive.

No. 10B.—*Roque's Island, Maine.*—This is on the southern side of an island bordering on Roque's Island thoroughfare, which separates Roque's Island from Spruce Island, and situated between Machias and Quoddy Head. The bed here was 3 feet thick, with old loam above it nearly a foot thick, the whole extending nearly a mile. This locality was not visited by myself, but reported by Lieut. J. A. Slocum, of the revenue-cutter Mosswood.

No. 11.—*Green Point along Letite, Passamaquoddy Bay, Maine.*—Not examined.

No. 12.—*Seely's Cove.*—Not examined.

No. 13.—*Bocabee, Passamaquoddy Bay.*—Not examined.

No. 13a.—*Damariscotta, Me.*—The shells of this well-known locality consist almost entirely of oysters, the beds covering many acres in extent to a depth of from 5 to 15 or 20 feet. The oysters were all very large and usually narrow or slipper-shaped. Very few are now found living in the vicinity. The number of worked bones of animals or of stone implements, mixed with the shells, is extremely small; a long search of perhaps an hour will sometimes be necessary before anything of the kind can be detected.

No. 13b.—*Bocabee.*—Not examined.

These constitute the principal localities examined in Eastern Maine and New Brunswick. As already stated, they are characterized in some cases by large beds of shells of the soft clam (*Mya arenaria*), never of the quahaug or *Venus mercenaria*, with a little admixture of earth; in others the shells are in a much decomposed condition, with black earth scattered among them; again, by the association of large bones, especially of the moose and caribou, with but little mixture of anything else. Occasionally these beds alternated with pure shell or pure bone, possibly the shells being aggregated in summer and the bones of mammals in winter. Everywhere the bones of the great auk were found, as also those of the beaver. The only other localities examined in Maine were some islands in Casco Bay, where the bones of the great auk were unusually abundant.

No. 13B.—*Nantasket Beach, Boston Harbor.*—At various points in the vicinity of this beach are found numerous seams and hillocks of shells, consisting, however, almost entirely of *Macra solidissima*, or horse-clams; neither *Mya* nor *Venus* were observed. The deposits are small and situated in the sand. The principal locality examined was near Skull Head.

No. 13C.—*Eagle Hill, near Ipswich, Mass.*—This locality is widely known from the investigations made therein by Messrs. Morse, Putnam, and other Massachusetts specialists.

The aboriginal shell beds are very extensive, and consist very largely

of shells of the *Mya*, or soft clam. The number of stone implements and of worked bone is, however, extremely small, much less than in the shell heaps of Maine and New Brunswick.

No locality on the coast perhaps furnishes so many fresh clams for commercial purposes as the vicinity of Ipswich, ploughs being used for turning them up. They are obtained by the thousands of barrels for bait for codfish, and the refuse shells constitute masses of enormous magnitude.

No. 14.—*Nonamesset Island, near Naushon, Buzzard's Bay.*—This locality is in the inner Hadley's Harbor, on Nick's Neck, the property of Mr. John M. Forbes, and nearly opposite to Wood's Holl, Mass. The heap is very extensive, covering quite an area of the beach, and abounds in bones of the deer. The shells are principally soft clams (*Mya*), with a few quahaugs and pectens. The stone implements are extremely scarce.

No. 15.—*Great Harbor, Wood's Holl, Mass.*—Quite an interesting locality exists on Long Neck, to the west of the guano factory. The deposit covers about one hundred square yards to a depth of a foot. The shells consist almost entirely of *Crepidula plana*. Bones were very scanty, and quite a notable proportion of these were of birds. Very few stone implements were found.

No. 16.—*Parker's Point, Wood's Holl.*—On the east side of Parker's Point, opposite the low, depressed portion, is quite an extensive bed of almost entire clam-shells, the quahaug, or hard clam (*Venus mercenaria*), and but little broken. The locality covers about two hundred square yards, to a depth of about two feet. No implements or bones of any kind were ever found in this locality.

No. 17.—*Quisset Harbor, on Buzzard's Bay, north of Wood's Holl.*—Here the heaps consisted entirely of shells of the quahaug. No bones nor implements of any kind were found.

No. 18.—*Cataumet Harbor, North Falmouth, Buzzard's Bay.*—Here is a very large deposit of quahaug shells, on a point in Squeteague Pond; but no bones or implements.

No. 19.—*Mud Cove, back of Toby Island, north end of Buzzard's Bay.*—Here, as in the three preceding localities, the deposit consisted also of shells, without any bones or implements.

I have already referred to the abundance of bones of the great auk in the shell heaps of New Brunswick and Maine. They also occur in considerable numbers at Eagle Hill, near Ipswich. I do not remember to have found any myself on Cape Cod, but am under the impression that Professor Wyman reports them as discovered by him at Cotuit, on Vineyard Sound. There is certainly a great scarcity of stone implements in the shell heaps of Southern Massachusetts, compared with what we find farther north.

All the collections made by me at the localities mentioned in the present paper are now in the National Museum.



## LIST OF MARINE INVERTEBRATES, MAINLY FROM THE NEW ENGLAND COAST, DISTRIBUTED BY THE UNITED STATES NATIONAL MUSEUM.

## SERIES II.

PREPARED BY RICHARD RATHBUN.

The species enumerated in the present list were collected by the U. S. Fish Commission, mainly during the past four years, and represent a portion of the duplicate material resulting from their sea-coast explorations, and now available for distribution. Several of the species included in these duplicate sets are recent additions to science, obtained by the U. S. Fish Commission steamer Fish Hawk, from the inner edge of the Gulf Stream Slope, south of Martha's Vineyard, during the summers of 1880 and 1881. This region, which was first explored in 1880, has proved to be the richest dredging ground yet discovered upon our coast, both as regards variety of life and abundance of specimens.

Nearly all the species enumerated are included in each set, but of a few species only enough duplicates were secured to supply a portion of the sets. In the printed list to accompany each set sent out, the species omitted from that set will be erased. Except where otherwise indicated, the specimens are all preserved in alcohol. The sets will number about one hundred. The crustacea have been identified, for the most part, by Prof. S. I. Smith, and most of the other species by Prof. A. E. Verrill. The names are mainly those used in the Preliminary Check-list of the Marine Invertebrata of the Atlantic Coast, by A. E. Verrill, edition of 1879. A considerable number of species that have since been described are, however, here included.

WASHINGTON, D. C., November, 1881.

## CRUSTACEA.

## DECAPODA.

- |  |  |
|--|--|
| 1. <i>Gelasimus pugnax</i> Smith.<br>U. S. F. C.—Narragansett Bay, R. I., shore.     | 9. <i>Hyas coarctatus</i> Leach.<br>U. S. F. C.—Gulf of Maine.   |
| 2. <i>Platyonichus ocellatus</i> Latr.<br>U. S. F. C.—Vineyard Sound, Mass., shore.  | 10. <i>Hyas coarctatus</i> Leach.<br>U. S. F. C.—George's Bank, 45 fath.                               |
| 3. <i>Platyonichus ocellatus</i> Latr. Young.<br>U. S. F. C.—Narragansett Bay, R. I. | 11. <i>Hyas coarctatus</i> Leach.<br>U. S. F. C.—Le Have Bank, 45 fath.                                |
| 4. <i>Carcinus mænas</i> Leach.<br>U. S. F. C.—Newport, R. I., shore.                | 12. <i>Libinia emarginata</i> Leach.<br>U. S. F. C.—Narragansett Bay, R. I.                            |
| 5. <i>Panopeus Sayi</i> Smith.<br>U. S. F. C.—Vineyard Sound, Mass., shore.          | 13. <i>Euprognatha rastellifera</i> Stimp.<br>U. S. F. C.—74 miles S. of Nantucket Island,<br>76 fath. |
| 6. <i>Cancer irroratus</i> Say.<br>U. S. F. C.—Narragansett Bay, R. I.               | 14. <i>Hippa talpoida</i> Say.<br>U. S. F. C.—Wood's Holl, Mass., shore.                               |
| 7. <i>Cancer irroratus</i> Say.<br>U. S. F. C.—Vineyard Sound, Mass.                 | 15. <i>Eupagurus pollicaris</i> Stimp.<br>U. S. F. C.—Vineyard Sound, Mass.                            |
| 8. <i>Cancer irroratus</i> Say. Young.<br>U. S. F. C.—Narragansett Bay, R. I.        | 16. <i>Eupagurus pollicaris</i> Stimp.<br>U. S. F. C.—Narragansett Bay, R. I.                          |



- 17. Eupagurus longicarpus** Stimp.  
U. S. F. C.—Naragansett Bay, R. I.
- 18. Parapagurus pilosimanus** Smith.  
U. S. F. C.—87 miles S. of Martha's Vineyard, 312 fath.
- 19. Munida**, Sp.  
U. S. F. C.—73 miles S. of Martha's Vineyard, 65 fath.
- 20. Homarus americanus** Edwards.  
U. S. F. C.—Southern coast of New England.
- 21. Crangon vulgaris** Fabr.  
U. S. F. C.—Vineyard Sound, Mass.
- 22. Pontophilus brevirostris** Smith.  
U. S. F. C.—73 miles S. of Martha's Vineyard, 65 fath.
- 23. Pandalus leptocerus** Smith.  
U. S. F. C.—60 miles S. of Martha's Vineyard, 45 fath.
- 24. Palæmonetes vulgaris** Stimp.  
U. S. F. C.—Naragansett Bay, R. I., shore.

#### SCHIZOPODA.

- 25. Mysis americana** Smith.  
U. S. F. C.—Vineyard Sound, Mass.
- 26. Thysanopoda norvegica** M. Sars.  
U. S. F. C.—Bay of Fundy, surface.

#### AMPHIPODA.

- 27. Orchestia agilis** Smith.  
U. S. F. C.—Newport, R. I., shore.
- 28. Talorchestia longicornis** Smith.  
U. S. F. C.—New Haven, Conn., shore.
- 29. Gammarus natator** Smith.  
U. S. F. C.—Wood's Holl, Mass.
- 30. Ptilocheirus pinguis** Stimp.  
U. S. F. C.—Long I. Id., off Noank, Conn.
- 31. Uncia irrorata** Say.  
U. S. F. C.—Off Newport, R. I.
- 32. Themisto bispinosa** Bæck.  
U. S. F. C.—87 miles S. of Block Island, R. I., 335 fath. (Stomach of Hake.)

#### ISOPODA.

- 33. Idotea robusta** Krøyer.  
U. S. F. C.—Off Block Island, R. I., surface.
- 34. Ligia oceanica** Fabr.  
U. S. F. C.—Newport, R. I., shore.
- 35. Æga psora** Krøyer.  
U. S. F. C.—Off Nova Scotia, on cod and halibut.

#### ENTOMOSTRACA.

- 36. Artemia gracilis** Verrill.  
U. S. F. C.—New Haven, Conn., salt vats.

- 37. Temora longicornis** Müller.  
U. S. F. C.—Block Island Sound, surface.

#### CIRRIPEDIA.

- 38. Lepas fascicularis** Ellis and Sol.  
U. S. F. C.—Vineyard Sound, Mass., surface.
- 39. Lepas anatifera** Linn.  
U. S. F. C.—100 miles off Martha's Vineyard, surface.
- 40. Balanus balanoides** Stimp.  
U. S. F. C.—New Haven, Conn., shore.
- 41. Balanus porcatus** Costa.  
U. S. F. C.—Off Chatham, Mass., 16 fath.
- 42. Balanus Hameri** Darwin.  
U. S. F. C.—Off Chatham, Mass., 16 fath.

#### MEROSTOMATA.

- 43. Limulus Polyphemus** Latr. Dry.  
U. S. F. C.—Southern New England, shore.

#### ANNELIDA.

##### CHÆTOPODA.

- 44. Aphrodita aculeata** Linné.  
U. S. F. C.—Off Martha's Vineyard, 150 to 216 fath.
- 45. Lætmatonice armata** Verrill.  
U. S. F. C.—Off Martha's Vineyard, 140 to 400 fath.
- 46. Lepidonotus squamatus** Leach.  
U. S. F. C.—Eastport, Me.
- 47. Lepidonotus squamatus** Leach.  
U. S. F. C.—Vineyard Sound, Mass., 8 to 12 fath.
- 48. Harmothoe imbricata** Malmgren.  
U. S. F. C.—Eastport, Me.
- 49. Nephthys incisa** Mgn.  
U. S. F. C.—Off Newport, R. I., 12 to 40 fath.
- 50. Nephthys incisa** Mgn.  
U. S. F. C.—Off Cape Cod, 10 to 50 fath.
- 51. Nephthys cæca** Johnst.  
U. S. F. C.—Cape Ann, Mass., shore.
- 52. Nereis virens** Malmgren.  
U. S. F. C.—New Haven, Conn., shore.
- 53. Nereis pelagica** Linné.  
U. S. F. C.—Vineyard Sound, Mass.
- 54. Nereis pelagica** Linné.  
U. S. F. C.—Off Chatham, Mass., 15 to 40 fath.
- 55. Hyalinœcia artifex** Verrill.  
U. S. F. C.—90 miles S. of Martha's Vineyard, 160 to 388 fath.

56. *Hyalinœcia artifex* Verrill.  
U. S. F. C.—78 miles S. of Martha's Vineyard, 192 fath.
57. *Hyalinœcia artifex* Verrill. Dry.  
U. S. F. C.—Off Martha's Vineyard, 160 to 388 fath.
58. *Euglycera dibranchiata* Ver.  
U. S. F. C.—Newport, R. I., shore.
59. *Clymenella torquata* Verrill.  
U. S. F. C.—Newport, R. I., shore.
60. *Citratulus grandis* Verrill.  
U. S. F. C.—Naushon Island, Mass., shore.
61. *Trophonia affinis* Verrill.  
U. S. F. C.—Off Newport, R. I.
62. *Sternaspis fossor* Stimp.  
U. S. F. C.—Off Martha's Vineyard, 20 to 100 fath.
63. *Amphitrite ornata* Verrill.  
U. S. F. C.—Naushon Island, Mass., shore.
64. *Thelepus cincinnatus* Verrill.  
U. S. F. C.—Bay of Fundy.
65. *Thelepus cincinnatus* Verrill.  
U. S. F. C.—Off Chatham, Mass., 16 to 40 fath.
66. *Potamilla reniformis* Mgn.  
U. S. F. C.—Off Chatham, Mass., 16 to 40 fath.
67. *Filigrana implexa* Berkeley.  
U. S. F. C.—Off Chatham, Mass., 16 to 40 fath.

## GEPHYREA.

68. *Phascolosoma Gouldii* Dies.  
U. S. F. C.—Newport, R. I., shore.
69. *Phascolion Strombi* Theel.  
U. S. F. C.—Narragansett Bay, R. I., 10 to 20 fath.
70. *Phascolion Strombi* Theel.  
U. S. F. C.—Off Martha's Vineyard, 40 to 150 fath.

## CHÆTOGNATHA.

71. *Sagitta elegans* Verrill.  
U. S. F. C.—Vineyard Sound, Mass., surface.

## MOLLUSCA.

## CEPHALOPODA.

72. *Loligo Pealei* Lesueur.  
U. S. F. C.—Vineyard Sound, Mass.
73. *Loligo Pealei* Lesueur. Young.  
U. S. F. C.—Buzzard's Bay, Mass., 7 fath.

74. *Loligo Pealei* Lesueur. Young.  
U. S. F. C.—Off Newport, R. I., 10 to 20 fath.
75. *Loligo Pealei* Lesueur. Eggs.  
U. S. F. C.—Narragansett Bay, R. I.
76. *Heteroteuthis tenera* Verrill.  
U. S. F. C.—Off Martha's Vineyard, 85 to 225 fath.
77. *Octopus Bairdii* Verrill.  
U. S. F. C.—Off Martha's Vineyard, 200 to 388 fath.

## GASTROPODA.

78. *Fulgur carica* Conrad. Dry.  
U. S. F. C.—Narragansett Bay, R. I.
79. *Fulgur carica* Conrad.  
U. S. F. C.—Narragansett Bay, R. I.
80. *Sycotypus canaliculatus* Gill. Dry.  
U. S. F. C.—Southern New England.
81. *Sycotypus canaliculatus* Gill.  
U. S. F. C.—New Haven, Conn.
82. *Neptunea propinqua* (Alder).  
U. S. F. C.—Off Martha's Vineyard, 65 to 300 fath.
83. *Neptunea (Siphonella) pygmæa* Verrill.  
U. S. F. C.—Off Martha's Vineyard, 65 to 150 fath.
84. *Neptunea Stimpsoni* var. (Mörch).  
U. S. F. C.—Off Martha's Vineyard, 40 to 100 fath.
85. *Buccinum undatum* Linné.  
U. S. F. C.—Off Martha's Vineyard, Mass., 28 to 40 fath.
86. *Tritia trivittata* H. and A. Adams.  
U. S. F. C.—Off Newport, R. I.
87. *Ilyanassa obsoleta* Stimp.  
U. S. F. C.—Newport, R. I., shore.
88. *Urosalpinx cinerea* Stimp.  
U. S. F. C.—Newport, R. I., shore.
89. *Eupleura caudata* Stimp.  
U. S. F. C.—Buzzard's Bay, Mass.
90. *Purpura lapillus* Lamarek.  
U. S. F. C.—Newport, R. I., shore.
91. *Astyris lunata* (Say) Dall.  
U. S. F. C.—Wood's Holl, Mass.
92. *Anachis avara* (Say). Perk.  
U. S. F. C.—Wood's Holl, Mass.
93. *Luvatia heros* H. & A. Adams. Dry.  
U. S. F. C.—Vineyard Sound, Mass.
94. *Neverita duplicata* Stimp. Dry.  
U. S. F. C.—Vineyard Sound, Mass.

**95. *Cingula Jan-Mayeni* (Fr.) Verrill.**  
U. S. F. C.—Off Martha's Vineyard, 238 to 500 fath.

**96. *Littorina littorea* Menke.**  
U. S. F. C.—Newport, R. I., shore.

**97. *Littorina palliata* Gould.**  
U. S. F. C.—Newport, R. I., shore.

**98. *Littorina rydis* Gould.**  
U. S. F. C.—Newport, R. I., shore.

**99. *Bittium nigrum* (Totten) Stimp.**  
U. S. F. C.—Wood's Holl, Mass.

**100. *Crepidula fornicata* Lam.**  
U. S. F. C.—Buzzard's Bay, Mass.

**101. *Crepidula convexa* Say. Dry.**  
U. S. F. C.—Off Newport, R. I.

**102. *Crepidula plana* Say.**  
U. S. F. C.—Off Newport, R. I.

**103. *Acmaea testudinalis* Han.**  
U. S. F. C.—Eastport, Me., shore.

**104. *Fiona nobilis* Ald. & Han.**  
U. S. F. C.—Off Martha's Vineyard, surface.

**105. *Pleurobranchia tarda* Verrill.**  
U. S. F. C.—Off Martha's Vineyard, 65 to 200 fath.

**106. *Scaphander puncto-striatus* (Mighels).**  
U. S. F. C.—Off Martha's Vineyard, 115 to 372 fath.

**107. *Melampus lineatus* Say.**  
U. S. F. C.—Newport, R. I., shore.

**108. *Trachydermon ruber* Carp.**  
U. S. F. C.—Eastport, Me.

**109. *Trachydermon albus* Carp.**  
U. S. F. C.—Eastport, Me.

#### SOLENOCONCHA.

**110. *Dentalium striolatum* Stimp.**  
U. S. F. C.—Eastport, Me., 10 to 30 fath.

#### LAMELLIBRANCHIATA.

**111. *Teredo megotara* Hanley.**  
U. S. F. C.—Off Martha's Vineyard, surface.

**112. *Clidiophora trilineata* Carp. Dry.**  
U. S. F. C.—Buzzard's Bay, Mass., 7 fath.

**113. *Mulinia lateralis* Gray. Young.**  
U. S. F. C.—Narragansett Bay, R. I.

**114. *Callista convexa* H. & A. Ad. Dry.**  
U. S. F. C.—Buzzard's Bay, Mass.

**115. *Tottenia gemma* Perkins. Dry.**  
U. S. F. C.—Provincetown, Mass., shore.

**116. *Cyprina islandica* Lam. Dry.**  
U. S. F. C.—Off Newport, R. I.

**117. *Loripes lens* Verrill & Smith.**  
U. S. F. C.—Off Martha's Vineyard, 85 to 120 fath.

**118. *Venericardia borealis* Carp.**  
U. S. F. C.—Off Newport, R. I., 13 to 15 fath.

**119. *Astarte undata* Gould.**  
U. S. F. C.—Narragansett Bay, R. I., 20 to 27 fath.

**120. *Astarte crenata* Gray.**  
U. S. F. C.—Off Martha's Vineyard, 100 to 365 fath.

**121. *Nucula proxima* Say. Dry.**  
U. S. F. C.—Narragansett Bay, R. I.

**122. *Nucula proxima* Say.**  
U. S. F. C.—Buzzard's Bay, Mass.

**123. *Yoldia limatula* Woodward.**  
U. S. F. C.—Narragansett Bay, R. I., 11 fath.

**124. *Yoldia sapotilla* Stimp.**  
U. S. F. C.—76 miles S. of Martha's Vineyard, 100 fath.

**125. *Yoldia thraciformis* (Storer) Stimp.**  
U. S. F. C.—Gulf of Maine, 50 to 100 fath.

**126. *Scapharca transversa* Ad. Dry.**  
U. S. F. C.—Off New Haven, Conn.

**127. *Limopsis minuta* (Phil.).**  
U. S. F. C.—Off Martha's Vineyard, 238 to 365 fath.

**128. *Modiola modiolus* Turton.**  
U. S. F. C.—Eastport Harbor, Maine.

**129. *Modiola plicatula* Lam.**  
U. S. F. C.—Newport, R. I., shore.

**130. *Mytilus edulis* Linn.**  
U. S. F. C.—Newport, R. I., shore.

**131. *Pecten irradians* Lam.**  
U. S. F. C.—Provincetown, Mass., shore.

**132. *Pecten tenuicostatus* Mighels.**  
U. S. F. C.—Off Martha's Vineyard, 45 fath.

**133. *Pecten tenuicostatus* Mighels. Dry.**  
U. S. F. C.—Off Newport, R. I.

**134. *Pecten vitreus* Woodward.**  
U. S. F. C.—Off Martha's Vineyard, 300 to 458 fath.

**135. *Anomia glabra* Verrill.**  
U. S. F. C.—Buzzard's Bay, Mass., 5 fath.

#### TUNICATA.

**136. *Asciidiopsis complanata* Verrill.**  
U. S. F. C.—Eastport Harbor, Me., 15 fath.

**137. Ciona ocellata** Verrill.

U. S. F. C.—Newport, R. I., shore.

**138. Molgula manhattensis** Verrill.

U. S. F. C.—Wood's Holl, Mass., shore.

**139. Halocynthia partita** Verrill.

U. S. F. C.—Newport, R. I., shore.

**140. Halocynthia pyramidalis** Verrill.

U. S. F. C.—Eastport, Me.

**141. Boltenia boltoni** (Linné.)

U. S. F. C.—Eastport Harbor, Me., 15 fath.

**142. Perophora viridis** Verrill.

U. S. F. C.—Wood's Holl, Mass., shore.

**143. Botryllus Gouldii** Verrill.

U. S. F. C.—Newport Harbor, R. I.

**144. Botryllus Gouldii** Verrill.

U. S. F. C.—Wood's Holl, Mass.

**145. Amorœcium pellucidum** Verrill.

U. S. F. C.—Vineyard Sound, Mass.

**146. Amorœcium stellatum** Verrill.

U. S. F. C.—Vineyard Sound, Mass.

**147. Amorœcium constellatum** Verrill.

U. S. F. C.—Vineyard Sound, Mass.

**148. Leptoclinum albidum** Verrill.

U. S. F. C.—Vineyard Sound, Mass.

**149. Salpa Caboti** Desor.

U. S. F. C.—Off Newport, R. I., surface.

**150. Salpa.** (Large species.)

U. S. F. C.—Off Martha's Vineyard, surface.

**MOLLUSCOIDA.****BRACHIOPODA.****151. Terebratulina septentrionalis** Gr.

U. S. F. C.—Eastport Harbor, Me., 15 fath.

**POLYZOA.****152. Bugula turrita** Verrill.

U. S. F. C.—Vineyard Sound, Mass.

**153. Bugula Murrayana** Busk.

U. S. F. C.—Off Cape Cod, Mass.

**154. Gemellaria loricata** Busk.

U. S. F. C.—Off Cape Cod, Mass.

**155. Electra pilosa** Fisch.

U. S. F. C.—Narragansett Bay, R. I.

**156. Lepralia americana** Verrill. Dry.

U. S. F. C.—Newport Harbor, R. I.

**157. Discopora nitida** Verrill.

U. S. F. C.—Vineyard Sound, Mass.

**ECHINODERMATA.****HOLOTHURIOIDEA.****158. Thyone Briareus** Selenka.

U. S. F. C.—Wood's Holl, Mass., shore.

**159. Leptosynapta Girardii** Verrill.

U. S. F. C.—Newport, R. I., shore.

**ECHINOIDEA.****160. Schizaster fragilis** (Dub. & Kor.) Dry.

U. S. F. C.—Off Martha's Vineyard, 100 to 258 fath.

**161. Echinarachnius parma** Gray. Dry.

U. S. F. C.—Cape Cod Bay, Mass.

**162. Strongylocentrotus dröbachien-**  
**sis** A. Ag.

U. S. F. C.—Off Newport, R. I.

**163. Arbacia punctulata** Gray.

U. S. F. C.—Newport Harbor, R. I., shore.

**ASTERIOIDEA.****164. Asterias Forbesii** Verrill.

U. S. F. C.—Newport, R. I., shore.

**165. Asterias vulgaris** Verrill.

U. S. F. C.—Off Martha's Vineyard, 20 to 50 fath.

**166. Asterias stellionura** Perrier.

U. S. F. C.—Off Nova Scotia, 90 to 200 fath.

**167. Leptasterias compta** Verrill.

U. S. F. C.—Off Block Id., R. I., 27 fath.

**168. Leptasterias compta** Verrill.

U. S. F. C.—Off Martha's Vineyard, 25 to 55 fath.

**169. Stephanasterias albula** Verrill.

U. S. F. C.—80 miles off Nantucket, 94 fath.

**170. Hippasteria phrygiana** Ag. Dry.

U. S. F. C.—Gulf of Maine, 50 to 100 fath.

**171. Cribrella sanguinolenta** Lütke.

U. S. F. C.—Bay of Fundy, 10 to 20 fath.

**172.—Odontaster hispidus** Verrill.

U. S. F. C.—Off Martha's Vineyard, 70 to 200 fath.

**173. Ctenodiscus crispatus** D. and Kor.

U. S. F. C.—Massachusetts Bay.

**174. Archaster americanus** Verrill.

U. S. F. C.—Off Martha's Vineyard.

**175. Archaster Agassizii** Verrill.

U. S. F. C.—Off Martha's Vineyard.

**176. Archaster Floræ** Verrill.

U. S. F. C.—Off Martha's Vineyard, 200 to 350 fath.



**OPHIUROIDEA.**

- 177. *Ophiopholis aculeata* Gray.**  
U. S. F. C.—Gulf of Maine.
- 178. *Ophiopholis aculeata* Gray.**  
U. S. F. C.—Off Martha's Vineyard, 130 to 200 fath.
- 179. *Ophioglypha Sarsii* Lyman.**  
U. S. F. C.—Off Martha's Vineyard, Mass., 45 fath.
- 180. *Ophioglypha Sarsii* Lym. Dry.**  
U. S. F. C.—Off Martha's Vineyard, Mass.
- 181. *Ophioscolex glacialis* M. & Tr.**  
U. S. F. C.—Off Martha's Vineyard, 200 to 258 fath.
- 182. *Ophiocnida olivacea* Lyman.**  
U. S. F. C.—Off Martha's Vineyard, 85 to 125 fath.
- 183. *Ophiacantha millespina* Verrill.**  
U. S. F. C.—Off Martha's Vineyard, 130 to 260 fath.
- 184. *Amphiura macilenta* Verrill.**  
U. S. F. C.—Off Martha's Vineyard, 61 fath.
- 185. *Astrophyton Agassizii* Stimp.**  
U. S. F. C.—Off Cape Cod, Mass., 20 to 30 fath.
- 186. *Astrophyton Agassizii* Stimp. Dry.**  
U. S. F. C.—Off Cape Cod, 20 to 30 fath.

**CRINOIDEA.**

- 187. *Antedon dentatum* (Say) Verrill.**  
(= *Sarsii* D. & K.)  
U. S. F. C.—75 miles S. of Nantucket, 146 fath
- 188. *Antedon dentatum* (Say) V. (= *Sarsii* D. & K.)**  
U. S. F. C.—Off Martha's Vineyard, 183 to 258 fath.

**CCELEENTERATA.**

**ANTHOZOA.**

- 189. *Pennatula aculeata* Dan.**  
U. S. F. C.—82 miles S. of Martha's Vineyard, 202 fath.
- 190. *Renilla reniformis*.**  
U. S. F. C.—Beaufort, N. C.
- 191. *Acanella Normani* Verrill.**  
U. S. F. C.—Off Martha's Vineyard.
- 192. *Alcyonium carneum* Ag.**  
U. S. F. C.—Off Cape Cod, 20 to 25 fath.

- 193. *Metridium marginatum* Edw. & H.**  
U. S. F. C.—Newport, R. I., shore.
- 194. *Sagartia abyssicola* Verrill.**  
U. S. F. C.—Off Martha's Vineyard, 100 to 300 fath.
- 195. *Urticina nodosa* Verrill.**  
U. S. F. C.—80 miles S. of Martha's Vineyard, 160 fath.
- 196. *Halocampa producta* Stimp.**  
U. S. F. C.—Newport, R. I., shore.
- 197. *Epizoanthus americanus* Verrill.**  
U. S. F. C.—75 miles S. of Martha's Vineyard, 86 fath.
- 198. *Epizoanthus paguriphila* Verrill.**  
U. S. F. C.—87 miles S. of Martha's Vineyard, 312 fath.

**HYDROIDEA.**

- 199. *Obeilia geniculata* Hincks.**  
U. S. F. C.—Off Newport, R. I., 13 fath.
- 200. *Sertularella tricuspidata* Hincks.**  
U. S. F. C.—George's Bank, 30 to 50 fath.
- 201. *Sertularia cupressina* Linné.**  
U. S. F. C.—Off Nova Scotia.
- 202. *Sertularia pumila* Linné.**  
U. S. F. C.—New Haven, Conn.
- 203. *Diphasia fallax* Agassiz.**  
U. S. F. C.—Eastport Harbor, Me., 15 fath.
- 204. *Globiceps tiarella* Ayres.**  
U. S. F. C.—Newport Harbor, R. I.

**PORIFERA.**

**SILICEA.**

- 205. *Microciona prolifera* Verrill. Dry.**  
U. S. F. C.—New Haven, Conn.
- 206. *Microciona prolifera* Verrill. Dry.**  
U. S. F. C.—Wood's Holl, Mass.
- 207. *Cliona sulphurea* Verrill.**  
U. S. F. C.—Narragansett Bay, R. I., 4 fath.
- 208. *Suberites compacta* Verrill.**  
U. S. F. C.—Massachusetts Bay.
- 209. *Tethya gravata* Hyatt.**  
U. S. F. C.—Buzzard's Bay, Mass., 5 fath.

**PROTOZOA.**

**RHIZOPODA.**

- 210. *Astrorhiza arenacea*. (Sch.)**  
U. S. F. C.—Off Block Island, R. I., 28 fath.



**LIST OF MARINE INVERTEBRATES FROM THE NEW ENGLAND COAST, DISTRIBUTED BY THE UNITED STATES NATIONAL MUSEUM.**

**SERIES III.—EDUCATIONAL SERIES.**

PREPARED BY RICHARD RATHBUN.

The United States National Museum, having received frequent applications for collections representing the principal groups of marine invertebrate animals occurring upon our coast, and suitable for class demonstration, in connection with zoological lectures, has prepared fifty collections of this character, for distribution the present winter. The specimens necessary for this undertaking have been selected from among the duplicates accumulated by the United States Fish Commission, in their explorations of the New England coast, and, therefore, represent only those groups which occur more or less abundantly in the waters of that region. At the present time, it is impossible to enlarge these sets, as many of the representative species, which it would be desirable to include in them, are of too rare occurrence, and have been collected only in small numbers.

The specimens are all preserved in alcohol, unless otherwise indicated in the list, and each set contains all the species enumerated.

WASHINGTON, D. C., *November, 1881.*

**CRUSTACEA.**

**DECAPODA.**

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|---|--|
| <p><b>1. <i>Gelasimus pugnax</i> Smith.</b><br/>FIDDLER CRAB.<br/>U. S. F. C.—New Haven, Conn., shore.</p> <p><b>2. <i>Callinectes hastatus</i> Ordway.</b><br/>BLUE CRAB; EDIBLE CRAB.<br/>U. S. F. C.—Chesapeake Bay.</p> <p><b>3. <i>Cancer irroratus</i> Say.</b><br/>ROCK CRAB.<br/>U. S. F. C.—Vineyard Sound, Mass.</p> <p><b>4. <i>Libinia emarginata</i> Leach.</b><br/>SPIDER CRAB.<br/>U. S. F. C.—Vineyard Sound, Mass.</p> <p><b>5. <i>Euprognatha rastellifera</i> Stimp.</b><br/>U. S. F. C.—74 miles S. of Nantucket Id.,<br/>76 fath.</p> <p><b>6. <i>Hippa talpoida</i> Say.</b><br/>SAND BUG; BAIT BUG.<br/>U. S. F. C.—Wood's Holl, Mass., shore.</p> <p><b>7. <i>Eupagurus pollicaris</i> Stimp.</b><br/>HERMIT CRAB.<br/>U. S. F. C.—New Haven, Conn.</p> | <p><b>8. <i>Eupagurus longicarpus</i> Stimp.</b><br/>HERMIT CRAB.<br/>U. S. F. C.—Narragansett Bay, R. I., 5 to<br/>15 fath.</p> <p><b>9. <i>Parapagurus pilosimanus</i> Smith.</b><br/>HAIRY-CLAWED HERMIT CRAB.<br/>U. S. F. C.—87 miles S. of Martha's Vine-<br/>yard, 312 fath.</p> <p><b>10. <i>Munida</i>, sp.</b><br/>U. S. F. C.—73 miles S. of Martha's Vine-<br/>yard, 65 fath.</p> <p><b>11. <i>Homarus americanus</i> Edw.</b><br/>AMERICAN LOBSTER.<br/>U. S. F. C.—New England coast.</p> <p><b>12. <i>Crangon vulgaris</i> Fabr.</b><br/>COMMON SHRIMP.<br/>U. S. F. C.—Narragansett Bay, R. I.</p> <p><b>13. <i>Pandalus leptocerus</i> Smith.</b><br/>DEEP-WATER PRAWN.<br/>U. S. F. C.—60 miles S. of Martha's Vine-<br/>yard, 45 fath.</p> <p><b>14. <i>Palæmonetes vulgaris</i> Stimp.</b><br/>COMMON PRAWN.<br/>U. S. F. C.—Narragansett Bay, R. I.</p> |
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**SCHIZOPODA.**

15. *Thysanopoda norvegica* M. Sars.  
SURFACE SHRIMP.  
U. S. F. C.—Bay of Fundy, surface.

**AMPHIPODA.**

16. *Orchestia agilis* Smith.  
SAND FLEA; BEACH FLEA.  
U. S. F. C.—Newport, R. I., shore.  
17. *Talorchestia longicornis* Smith.  
LARGE SAND FLEA.  
U. S. F. C.—New Haven, Conn., shore.  
18. *Ptilocheirus pinguis* Stimp.  
U. S. F. C.—Long Id. Sd., off Noank, Conn.

**ISOPODA.**

19. *Idotea robusta* Kröyer.  
U. S. F. C.—Off Block Id., R. I., surface.  
20. *Ligia oceanica* Fabr.  
U. S. F. C.—Newport, R. I., shore.

**ENTOMOSTRACA.**

21. *Artemia gracilis* Verrill.  
BRINE SHRIMP.  
U. S. F. C.—New Haven, Conn.  
22. *Temora longicornis* Müller.  
MENHADEN FEED.  
U. S. F. C.—Block Id. Sound, surface.

**CIRRIPEDIA.**

23. *Lepas fascicularis* Ellis and Sol.  
CLEAR GOOSE BARNACLE.  
U. S. F. C.—Vineyard Sound, Mass., surface.  
24. *Lepas anatifera* Linn.  
GOOSE BARNACLE.  
U. S. F. C.—100 miles off Martha's Vineyard, surface.  
25. *Balanus balanoides* Stimp. Dry.  
ROCK BARNACLE; ACORN SHELL.  
U. S. F. C.—New Haven, Conn., shore.

**MEROSTOMATA.**

26. *Limulus Polyphemus* Latr. Dry.  
KING CRAB; HORSE-SHOE CRAB.  
U. S. F. C.—Vineyard Sound, Mass., shore.

**ANNELIDA.**

**CHÆTOPODA.**

27. *Lepidonotus squamatus* Kinb.  
U. S. F. C.—Bay of Fundy.  
28. *Lætmatonice armata* Verrill.  
U. S. F. C.—Off Martha's Vineyard, 100-200 fath.

29. *Nephtys cæca* Johnst.  
U. S. F. C.—Cape Ann, Mass., shore.  
30. *Nereis virens* Malmgren.  
CLAM WORM; BAIT WORM.  
U. S. F. C.—Newport, R. I., shore.  
31. *Hyalinœcia artifex* Verrill.  
DEEP SEA, TUBE-DWELLING WORM.  
U. S. F. C.—80 miles off Martha's Vineyard, 192 fath.  
32. *Hyalinœcia artifex* Verrill. Dry.  
(TUBES ONLY).  
U. S. F. C.—Off Martha's Vineyard, Mass., about 200 fath.

**GEPHYREA.**

33. *Phascolosoma Gouldii* Dies.  
(SIPUNCULOID WORM.)  
U. S. F. C.—Newport, R. I., shore.  
34. *Phascolion Strombi* Theel.  
(SIPUNCULOID WORM.)  
U. S. F. C.—Narragansett Bay, R. I., 16 fath.

**CHÆTOGNATHA.**

35. *Sagitta elegans* Verrill.  
U. S. F. C.—Vineyard Sd., Mass., surface.

**MOLLUSCA.**

**CEPHALOPODA.**

36. *Loligo Pealei* Lesueur.  
SQUID.  
U. S. F. C.—Vineyard Sound, Mass.  
37. *Loligo Pealei* Lesueur. Eggs.  
SQUID.  
U. S. F. C.—Narragansett Bay, R. I.

**GASTROPODA.**

38. *Buccinum undatum* Linn.  
WHEEL.  
U. S. F. C.—Eastport, Me., shore.  
39. *Tritia trivittata* H. & A. Ad.  
U. S. F. C.—Off Newport, R. I.  
40. *Ilyanassa obsoleta* Stimpson.  
BLACK MUD-SNAIL.  
U. S. F. C.—Gloucester, Mass., shore.  
41. *Purpura lapillus* Lamarck.  
PURPLE.  
U. S. F. C.—Barnstable, Mass., shore.  
42. *Littorina littorea* Menke.  
PERIWINKLE.  
U. S. F. C.—Gloucester, Mass., shore.  
43. *Littorina palliata* Gould.  
SMALL PERIWINKLE.  
U. S. F. C.—Gloucester, Mass., shore.

March 8, 1882.

**44. *Crepidula fornicata* Lam. Dry.**

DOUBLE-DECKER; BOAT SHELL.

U. S. F. C.—New Haven, Conn.

**45. *Trachydermon albus* Carp.**

U. S. F. C.—Eastport, Me.

**46. *Acmaea testudinalis* Han.**

LIMPET.

U. S. F. C.—Eastport, Me., shore.

**47. *Melampus lineatus* Say.**

SALT-MARSH SNAIL.

U. S. F. C.—Newport, R. I., shore.

**SOLENOCONCHA.****48. *Dentalium striolatum* Stimp.**

U. S. F. C.—Eastport, Me.

**LAMELLIBRANCHIATA.****49. *Mya arenaria* Linn.**

LONG CLAM.

U. S. F. C.—Gloucester, Mass., shore.

**50. *Clidiophora trilineata* Carp. Dry.**

U. S. F. C.—Buzzard's Bay, Mass., 7 fath.

**51. *Mulinia lateralis* Gray. Young.**

U. S. F. C.—Narragansett Bay, R. I.

**52. *Venus mercenaria* Linn.**

ROUND CLAM; QUAHOG.

U. S. F. C.—Southern New England.

**53. *Totentia gemma* Perkins. Dry.**

U. S. F. C.—Provincetown, Mass., shore.

**54. *Nucula proxima* Say.**

U. S. F. C.—Narragansett Bay, R. I.

**55. *Mytilus edulis* Linn.**

COMMON MUSSEL.

U. S. F. C.—Newport, R. I., piles of wharves.

**56. *Modiola modiolus* Turton.**

HORSE MUSSEL.

U. S. F. C.—Eastport, Me., shore.

**57. *Modiola plicatula* Lamarek.**

RIBBED MUSSEL.

U. S. F. C.—Newport, R. I., shore.

**58. *Pecten irradians* Lam.**

COMMON SCOLLOP.

U. S. F. C.—Buzzard's Bay, Mass.

**59. *Pecten tenuicostatus* Mighels.**

SMOOTH SCOLLOP.

U. S. F. C.—Off Martha's Vineyard, 45 fath.

**60. *Pecten tenuicostatus* Mighels. Dry.**

SMOOTH SCOLLOP.

U. S. F. C.—Off Martha's Vineyard.

**61. *Anomia glabra* Verrill.**

SILVER-SHELL; GOLD-SHELL; JINGLE-SHELL.

U. S. F. C.—Buzzard's Bay, Mass., 5 fath.

**62. *Ostrea Virginiana* Lister. Dry.**

OYSTER.

U. S. F. C.—Chesapeake Bay.

**TUNICATA.****63. *Ascidioopsis complanata* Verrill.**

SEA POTATO.

U. S. F. C.—Eastport Harbor, Me., 15 fath.

**64. *Molgula manhattensis* Verrill.**

U. S. F. C.—Race Point, Cape Cod, Mass., shore.

**65. *Halocynthia partita* Verrill.**

U. S. F. C.—Wood's Holl, Mass., shore.

**66. *Boltenia Bolteni* (Linn.)**

STEMMED SEA-PEACH.

U. S. F. C.—Eastport Harbor, Me., 15 fath.

**67. *Botryllus Gouldii* Verrill.**

U. S. F. C.—Newport Harbor, R. I.

**68. *Amorœcium pellucidum* Verrill.**

U. S. F. C.—Vineyard Sound, Mass.

**69. *Amorœcium stellatum* Verrill.**

U. S. F. C.—Vineyard Sound, Mass.

**70. *Amorœcium constellatum* Verrill.**

U. S. F. C.—Vineyard Sound, Mass.

**71. *Leptoclinum albidum* Verrill.**

U. S. F. C.—Vineyard Sound, Mass., 14 fath.

**72. *Salpa Caboti* Desor.**

U. S. F. C.—Off Newport, R. I., surface.

**MOLLUSCOIDA.****BRACHIOPODA.****73. *Terebratulina septentrionalis* Gray.**

LAMP SHELL.

U. S. F. C.—Eastport Harbor, Me., 15 fath.

**POLYZOA.****74. *Bugula turrita* Verrill.**

U. S. F. C.—Narragansett Bay, R. I., 4 fath.

**75. *Electra pilosa* Fisch.**

U. S. F. C.—Narragansett Bay, R. I.

**76. *Lepralia americana* Verrill.**

U. S. F. C.—Newport Harbor, R. I.

**ECHINODERMATA.****HOLOTHURIOIDEA.****77. *Thyone Briareus* Selenka.**

SEA-CUCUMBER.

U. S. F. C.—Wood's Holl, Mass., shore.

**ECHINOIDEA.****78. *Strongylocentrotus dröbachiensis* A. Ag.**

COMMON SEA-URCHIN; GREEN SEA-EGG.

U. S. F. C.—Off Newport, R. I.

- 79. *Arbacia punctulata* Gray.**  
PURPLE SEA-URCHIN.  
U. S. F. C.—Newport Harbor, R. I., shore.
- 80. *Echinarachnius parma* Gray.** Dry.  
SAND-DOLLAR.  
U. S. F. C.—Cape Cod Bay, Mass.

#### ASTERIOIDEA.

- 81. *Asterias Forbesii* Verrill.**  
GREEN STAR-FISH.  
U. S. F. C.—Newport, R. I., shore.
- 82. *Leptasterias compta* Verrill.**  
U. S. F. C.—18 miles S. E. of Block Island,  
R. I., 27 fath.
- 83. *Ctenodiscus crispatus* D. and Kor.**  
VELVET STAR.  
U. S. F. C.—Massachusetts Bay.
- 84. *Archaster americanus* Verrill.**  
U. S. F. C.—Off Martha's Vineyard, Mass.,  
about 200 fath.

#### OPHIUROIDEA.

- 85. *Ophiopholis aculeata* Gray.**  
VARIEGATED SERPENT-STAR.  
U. S. F. C.—Gulf of Maine.
- 86. *Ophioglypha Sarsii* Lyman.**  
SARS' SERPENT-STAR.  
U. S. F. C.—Off Martha's Vineyard, 45 fath.
- 87. *Ophioglypha Sarsii* Lyman.** Dry.  
SARS' SERPENT-STAR.  
U. S. F. C.—Off Martha's Vineyard, Mass.,  
about 200 fath.
- 88. *Astrophyton Agassizii* Stimp.**  
BASKET-FISH.  
U. S. F. C.—Off Cape Cod, Mass.

#### CRINOIDEA.

- 89. *Antedon dentatum* (say) V. (= *Sarsii*  
D. & K.).** See No. 187, page 303.)  
FEATHER STAR.  
U. S. F. C.—75 miles S. of Nantucket, 146  
fath.

#### CŒLEENTERATA. ANTHOZOA.

- 90. *Pennatula aculeata* Dan.**  
SPINY SEA-FEATHER.  
U. S. F. C.—82 miles S. of Martha's Vine-  
yard, 202 fath.

- 91. *Acanella Normani* Verrill.**  
JOINTED BUSH-CORAL.  
U. S. F. C.—Off Martha's Vineyard, about  
200 fath.
- 92. *Primnoa reseda* Verrill.**  
BUSH-CORAL.  
U. S. F. C.—Fishing Banks, off Nova Sco-  
tia.
- 93. *Urticina nodosa* Verrill.**  
WARTY SEA-ROSE.  
U. S. F. C.—80 miles S. of Martha's Vine-  
yard, 160 fath.
- 94. *Epizoanthus americanus* Verrill.**  
U. S. F. C.—75 miles S. of Martha's Vine-  
yard, 86 fath.
- 95. *Epizoanthus paguriphila* Verrill.**  
U. S. F. C.—87 miles S. of Martha's Vine-  
yard, 86 fath.

#### HYDROIDEA.

- 96. *Obelia geniculata* Hincks.**  
U. S. F. C.—Off Block Island, R. I., 13 fath.
- 97. *Diphasia fallax* Agassiz.**  
U. S. F. C.—Eastport Harbor, Me., 15 fath
- 98. *Globiceps tiarella* Ayres.**  
U. S. F. C.—Newport Harbor, R. I.

#### PORIFERA.

##### SILICEA.

- 99. *Chalina oculata* Bowerb.** Dry.  
FINGER-SPONGE.  
U. S. F. C.—Narragansett Bay, R. I.
- 100. *Suberites compacta* Verrill.** Dry.  
U. S. F. C.—Buzzard's Bay, Mass.
- 101. *Cliona sulphurea* Verrill.**  
BORING SPONGE.  
U. S. F. C.—Buzzard's Bay, Mass.

#### PROTOZOA.

##### RHIZOPODA.

- 102. *Astrorhiza arenacea* (Sch.)**  
U. S. F. C.—20 miles S. E. of Block Island,  
R. I., 28 fath.

**CATALOGUE OF A COLLECTION OF JAPANESE WOODS PRESENTED  
TO THE UNITED STATES NATIONAL MUSEUM BY THE UNIVERSITY  
OF TOKIO, JAPAN.**

The collection of woods recently presented to the National Museum by the University of Tokio, a catalogue of which is herewith presented, has been prepared in a very unique and artistic manner. Each kind of wood is represented by a polished panel about 9 by 12 inches in dimension, upon which are painted, in color, accurate delineations of the leaves, flowers, and fruit of the tree. Each panel is framed between strips of wood sawn from the outer portion of the tree, and covered with bark provided with corner pieces, which are round blocks cut transversely from branches an inch or more in diameter. The catalogue of this collection has been prepared by Mr. Lester F. Ward, who has supplied the modern approved names for such species as are labeled with the older synonyms. In a few cases no authority could be found for the name given, while in others the species are not named and have been provisionally determined.

MAGNOLIACEÆ.

1. *Illicium anisatum*, L.
2. *Magnolia hypoleuca*, Sieb. & Zucc.

BIXINEÆ.

3. *Idesia polycarpa*, Maxim.

TERNSTREMIACEÆ.

4. *Eurya Japonica*, Thunb.
5. *Stuartia monadelphæ*, Sieb. & Zucc.
6. *Camellia Sanagua*, Thunb.
7. *Camellia Japonica*, L.

MALVACEÆ.

8. *Hibiscus Syriacus*, L.

TILIACEÆ.

9. *Tilia Mandschurica*, Maxim.

RUTACEÆ.

10. *Xanthoxylum piperitum*, DC.
11. *Citrus trifoliata*, L.
12. *Citrus vulgaris*(?), Riss.

SIMARUBEÆ.

13. *Picrasma ailanthoides*, Planch.



MELIACEÆ.

14. *Melia Azedarach*, Adans.

ILICINEÆ.

15. *Ilex Sieboldi* (?).  
16. *Ilex integra*, Thunb.  
17. *Ilex crenata*, Thunb.

CELASTRINEÆ.

18. *Euonymus Sieboldianus*, Blum.

RHAMNEÆ.

19. *Zizyphus vulgaris*, Lam.  
20. *Hovenia dulcis*, Thunb.

SAPINDACEÆ.

21. *Æsculus turbinata* (?).  
22. *Sapindus Mucorossi*, Gaertn.  
23. *Acer palmatum*, Thunb.  
24. *Acer spicatum* (?), Lam.

ANACARDIACEÆ

25. *Rhus semialata*, Murr.  
26. *Rhus succedanea*, L.  
27. *Rhus vernicifera*, DC.

LEGUMINOSÆ.

28. *Sophora Japonica* (?), L.  
29. *Gleditschia Sinensis*, Lam.  
[*G. Japonica*, Lodd.]  
30. *Albizzia Julibrissin*, Durazz.

ROSACEÆ.

31. *Prunus Persica*, Benth. & Hook.  
[*Amygdalus Persica*, L.]  
32. *Prunus Mume*, Sieb. & Zucc.  
33. *Prunus ssiori* (?), Fr.  
34. *Prunus Japonica*, Thunb. (1.)  
35. *Prunus Japonica*, Thunb. (2.)  
36. *Prunus pseudo-cerasus*, Steud.  
37. *Prunus subhirtella* (?).  
38. *Pirus Chincensis*, Roxb.  
39. *Pirus communis*, L., [var. *Sincensis*?].  
40. *Photinia Japonica*, Benth. & Hook.  
41. *Photinia glabra*, Maxim.

## CORNACEÆ.

42. *Cornus officinalis*, Sieb. & Zucc.  
 43. *Cornus brachypoda*, C. A. Mey.

## CAPRIFOLIACEÆ.

44. *Sambucus racemosa*, L.

## EBENACEÆ.

45. *Diospyros Kaki*, L.  
 46. *Diospyros Lotus*, L.

## STYRACEÆ.

47. *Styrax Japonicum*, Sieb. & Zucc.

## OLEACEÆ.

48. *Olea Aquifolium*, Thunb.  
 49. *Olea fragrans*, Thunb.  
 50. *Ligustrum Ibot*a, Sieb. & Zucc.  
 51. *Ligustrum Japonicum*, Thunb.

## SCROPHULARINEÆ.

52. *Paulownia imperialis*, Sieb. & Zucc.

## GESNERACEÆ.

53. *Didymocarpus Japonicus*, Benth. & Hook.  
 [*Rotlera Japonica* Spreng.]

## VERBENACEÆ.

54. *Vitex cannabifolia*, Sieb. & Zucc.  
 55. *Clerodendron trichotomum*, Thunb.

## LAURINEÆ.

56. *Cinnamomum Loureirii*, Nees.

## ELÆAGNACEÆ.

57. *Elæagnus pungens*, Thunb.

## URTICACEÆ.

58. *Zelkova acuminata*, Planch.  
 [*Planera Kaki*, hort.]  
 [*Zelkova Keaki* (?).]  
 59. *Celtis Sinensis*, Pers.  
 60. *Aphananthe aspera*, Planch.  
 61. *Morus alba*, L.

JUGLANDEÆ.

- 62. *Juglans Sieboldiana*, Maxim.
- 63. *Juglans Mandchourica*, Maxim.
- 64. *Pterocarya rhoifolia*, Sieb. & Zucc.

CUPULIFERÆ.

- 65. *Alnus maritima*, Nutt.
- 66. *Alnus incana*, L.
- 67. *Quercus dentata*, Thunb.
- 68. *Quercus glandulifera*, Blume.
- 69. *Quercus serrata*, Thunb.
- 70. *Quercus glabra*, Thunb.
- 71. *Quercus acuta*, Thunb. (1.)
- 72. *Quercus acuta*, Thunb. (2.)
- 73. *Quercus glauca*, Thunb.
- 74. *Quercus cuspidata*, Thunb.
- 75. *Castanea vulgaris*, Lam.

SALICINEÆ.

- 76. *Salix Bürgeriana* (?).

CONIFERÆ.

- 77. *Thuya squarrosa*, Benth & Hook.  
[*Retinospora squarrosa*, Sieb. & Zucc.]  
[*Thuyopsis squarrosa* (?).]
- 78. *Thuya orientalis*, L.  
[*Biota orientalis*, Don.]
- 79. *Thuya obtusa*, Mill.  
[*Retinospora obtusa*, Sieb. & Zucc.]  
[*Chamaecyparis obtusa*, Endl.]
- 80. *Thuya pisifera*, Benth. & Hook.  
[*Retinospora pisifera*, Sieb. & Zucc.]  
[*Chamaecyparis pisifera*, Endl.]
- 81. *Thuya plumosa*, Benth. & Hook.  
[*Chamaecyparis* sp.]
- 82. *Cryptomeria Japonica*, Don.
- 83. *Torreya nucifera*, Sieb. & Zucc.
- 84. *Ginkgo biloba*, L.
- 85. *Pinus Koraiensis*, Sieb. & Zucc.
- 86. *Pinus parviflora*, Sieb. & Zucc.
- 87. *Pinus densiflora*, Sieb. & Zucc.
- 88. *Pinus Thunbergii*, Parlat.
- 89. *Abies firma*, Sieb. & Zucc.

PALMACEÆ.

- 90. *Chamærops excelsa*, Thunb.

**A PARTIAL BIBLIOGRAPHY OF THE FISHES OF THE PACIFIC COAST OF THE UNITED STATES AND OF ALASKA, FOR THE YEAR 1880.**

**By TARLETON H. BEAN.**

We have, in Bulletin 11 of the United States National Museum, a bibliography of the fishes of the Pacific coast of the United States, brought up to the end of 1879, by Prof. Theodore Gill. There was, however, such great activity of publication during 1880 on the fishes of the same waters that I have collected the titles of papers in the principal works referring to the region, in order to make them immediately available in conjunction with the Bulletin already printed.

The titles are arranged, for the most part, strictly in the order of their publication; in a few cases, however, this order was not ascertained, and they are simply placed with those published in the same month.

**1879**—Description of a new fish from Alaska (*Anarrhichas lepturus*), with notes upon other species of the genus *Anarrhichas*. By **Tarleton H. Bean**. <Proc. U. S. Nat. Museum, v. 2, pp. 212-218, Dec. 6, 1879.

[Measurements of *Anarrhichas lepturus*, *A. lupus*, *A. latifrons*. Synopsis of all the species.]

**1880**—

Notes on certain typical specimens of American fishes in the British Museum and in the Museum d'Histoire Naturelle at Paris. By **David S. Jordan**, M. D. <Proc. U. S. Nat. Museum, v. 2, Jan. 20, 1880.

[*Ceratichthys cumingi* Günthr. noticed at page 226.]

Descriptions of new species of North American fishes. By **David S. Jordan**. <Proc. U. S. Nat. Museum, v. 2, pp. 235-241, Jan. 20, 1880.

[*Xiphister* proposed as a substitute for *Xiphidion* Girard, at p. 241.]

The salmon industries of Oregon. <The Popular Science Monthly, pp. 573-574, vol. xvi, No. iv, Feb., 1880.

On the Pacific species of *Caulolatilus*. By **W. N. Lockington**. <Proc. Acad. Nat. Sci., Phila., pp. 13-19 (sig. 2), March 23, 1880.

[*Caulolatilus anomalus* (Cooper) Gill and *C. affinis* Gill are conjectured to be identical with *C. princeps* (Jenyns) Gill. The material upon which the above paper is based is insufficient to establish the synonymy proposed. Without some explanation it would be difficult to understand the table of dimensions on page 17: the third column of figures, beginning with  $30\frac{1}{2}$ , and the second column, beginning with 10.05 inches, should be transposed. The columns beginning with  $30\frac{1}{2}$  and  $23\frac{1}{2}$  should have this heading: "Hundredths of total length."]

Descriptions of new genera and species of fishes from the coast of California. By **W. N. Lockington**. <Proc. U. S. Nat. Museum, v. 2, pp. 326-332, March 25, 1880.

[N. g. and n. s. *Leurynnis paucidens*, n. g. and n. s. *Odontopyxis trispinosus*, n. s. *Artedius quadriseriatus*. *Leurynnis*=*Lygodopsis*, Collett, *vide* Gill, <Proc. U. S. Nat. Museum, v. 3, p. 247. *Odontopyxis*=*Podothecus*, *vide* Jordan and Gilbert, <Proc. U. S. Nat. Museum, v. 3, p. 454.]

Descriptions of some genera and species of Alaskan fishes. By **Tarleton H. Bean**. <Proc. U. S. Nat. Museum, v. 2, pp. 353-359, March 29, 1880.

[*Cottus polyacanthocephalus* Pallas, *Melletes papilio*, n. g. and n. s., *Dallia pectoralis*, n. g. and n. s.]

1880—Continued.

Notes on a collection of Fishes from San Diego, California. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, v. 3, pp. 23-34, April 26-May 6, 1880.

[An annotated list of 57 species which were collected by the writers in January, 1880. The following new genera are described: *Roncador* and *Leuresthes*, and the new species *Aphoristia atricauda*, *Dasybatis dipterurus*, and *Platyrrhina exasperata*.]

Description of a New Flounder (*Xystreureys liolepis*) from Santa Catalina Island, California. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, v. 3, pp. 34-36, May 6, 1880.

Description of a new ray (*Platyrrhina triseriata*), from the coast of California. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, v. 3, pp. 36-38, May 6, 1880.

Description of a new species of "rock cod" (*Sebastichthys sericeus*) from the coast of California. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, v. 3, pp. 38-40, May 6, 1880.

On the occurrence of *Cephaloscyllium laticeps* (Duméril) Gill, on the coast of California. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, v. 3, pp. 40-42, May 6, 1880.

On the oil shark of Southern California (*Galeorhinus galeus*). By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, v. 3, pp. 42-43, May 6, 1880.

The surf smelt of the northwest coast, and the method of taking them by the Quillehute Indians, west coast of Washington Territory. By **James G. Swan**. <Proc. U. S. Nat. Museum, v. 3, pp. 43-46, May 6, 1880.

[Referring to *Hypomesus pretiosus* Girard, under the name *H. olidus*.]

Description of a new flounder (*Pleuronichthys verticalis*), from the coast of California, with notes on other species. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, v. 3, pp. 49-51, May 6, 1880.

[*Pleuronectes quadrituberculatus* Pallas is here referred to *Pleuronichthys*, but is restored to its proper genus in a subsequent paper by the same authors. The additional species are *Pleuronichthys cœnosus*, *Xystreureys liolepis* and *Atheresthes* (n. g.) *stomias* based upon *Platysomatichthys stomias* Jordan and Gilbert.]

Notes on sharks from the coast of California. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, v. 3, pp. 51-52, May 6, 1880.

[*Pleuracromylon lævis* (Risso) Gill recorded from Monterey.]

On the generic relations of *Platyrrhina exasperata*. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, v. 3, p. 53, May 6, 1880

[*Zapteryx* (n. g.) created for this species.]

Remarks on the species of the genus *Chirus* found in the San Francisco market, including one hitherto undescribed. By **W. N. Lockington**. <Proc. U. S. Nat. Museum, v. 3, pp. 53-57, May 6, 1880.

[*Chirus maculo-seriatus* (n. s.), *C. guttatus* and *C. constellatus* are all equal to *Hexagrammus decagrammus*, fide Jordan and Gilbert, same volume, p. 455.]

Description of a new fish from Alaska (*Uranidea microstoma*.) By **W. N. Lockington**. <Proc. U. S. Nat. Museum, v. 3, pp. 58-59, May 6, 1880.

Description of a new species of *Agonidae* (*Brachyopsis verrucosus*), from the coast of California. By **W. N. Lockington**. <Proc. U. S. Nat. Museum, v. 3, pp. 60-63, May 6, 1880.

[*Brachyopsis*, Gill, is defined on page 63.]

Description of a new genus and some new species of California fishes (*Iceosteus ænigmaticus* and *Osmernus attenuatus*). By **W. N. Lockington**. <Proc. U. S. Nat. Museum, v. 3, pp. 63-68, May 6-24, 1880.



## 1880—Continued.

Notes on California fishes.—*Salmonidæ*. By **W. N. Lockington**. <Amer. Naturalist, vol. xiv, No. 5, pp. 366-368, May, 1880.

[The statement concerning the anal rays of the Pacific coast salmon as distinguished from those of European salmon and all trout may have been obscured by some typographical error. The list of species on page 368 should be compared with Jordan and Gilbert's list of Pacific coast species in Proc. U. S. Nat. Museum, iii, pages 452 to 458, in order to make it agree with the latest nomenclature. *Hypomesus olidus* is not Californian; the Californian species is *H. pretiosus*.]

Description of a new species of *Sebastichthys* (*Sebastichthys miniatus*), from Monterey Bay, California. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, iii, pp. 70-73, May 24, 1880.

Description of a new species of "rock-fish" (*Sebastichthys carnatus*), from the coast of California. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, iii, pp. 73-75, May 24, 1880.

Check list of duplicates of North American fishes distributed by the Smithsonian Institution in behalf the United States National Museum, 1877-'80. By **Tarleton H. Bean**. <Proc. U. S. Nat. Museum, vol. 3, pp. 75-116, May 24-June 7, 1880.

[15 west coast species were distributed.]

Description of a new species of ray (*Raja stellulata*) from Monterey California. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, iii, pp. 133-135, July 2, 1880.

Descriptions of new species of *Xiphister* and *Apodichthys*, from Monterey, California. <Proc. U. S. Nat. Museum, iii, pp. 135-140, July 2, 1880.

[*Xiphister chirus* n. s., *Xiphister rupestris* n. s., *Apodichthys fucorum* n. s. The writers, on page 138, express the opinion that *Cebedichthys*, *Xiphister*, and *Apodichthys* do not represent distinct families.]

Description of two new species of *Sebastichthys* (*Sebastichthys entomelas* and *Sebastichthys rhodochloris*), from Monterey Bay, California. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, iii, pp. 142-146, July 2, 1880.

[List of the species of *Sebastichthys* obtained in Monterey Bay, pp. 145-146.]

On the occurrence of a species of *Cremnobates* at San Diego, California. By **Rosa Smith**. <Proc. U. S. Nat. Museum, iii, pp. 147-149, July 2, 1880.

[*Cremnobates integripinnis* n. s.]

Description of a new Agonoid fish (*Brachyopsis xyosternus*), from Monterey Bay, California. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, iii, pp. 152-154, July 2, 1880.

Description of a new flounder (*Hippoglossoides exilis*), from the coast of California. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, iii, pp. 154-156, July 2, 1880.

The herring of the Pacific coast. By **W. N. Lockington**. <Amer. Naturalist, vol. xiv, No. 7, pp. 518, 519, July, 1880.

[Distinguishing characters of *Clupea sagax* and *C. mirabilis*.]

Ichthyologische Beiträge (ix). Von Dr. **Franz Steindachner**, wirklichem Mitgliede der k. Akademie der Wissenschaften. (Mit 6 Tafeln.) (Vorgelegt in der Sitzung am 15. Juli 1880.) <Sitzb. der k. Akad. der Wissensch., B. lxxxii, I Abth., Juli-Heft, pp. 29 (238-266), 1880.

II.—Über zwei neue Agonus—Arten aus Californien. *Agonus* (*Brachyopsis*) *Barkani* n. sp., Taf. v.

[From San Francisco. Equals *Brachyopsis verrucosus* Lockington, according to Jordan and Gilbert, Proc. U. S. N. M., iii, p. 332.]

*Agonus* (*Brachyopsis*) *Annae* n. sp., Taf. vi, figs. 1-16.

[Vicinity of San Francisco. Equals *Brachyopsis xyosternus* Jordan and Gilbert, according to Jordan and Gilbert, op. et loc. cit.]

1880—Continued.

III.—Über einige Fischarten aus dem nördlichen Japan, gesammelt vom Professor **Dybowskii**.

[*Sebastes Taczanowskii* n. s., *Hypoptichus Dybowskii* n. g. and n. s., *Centronotus Dybowskii* n. s., *Centronotus Taczanowskii* n. s., *Neozarces pulcher* n. g. and n. s., *Gasterosteus japonicus* n. s. *Urocentrus pictus* Kner is referred to *Centronotus*, and *Centronotus quinque-maculatus* Kner to *Opisthocentrus quinque-maculatus* Kner. The types of the last two species were from De Castries Bay, and not from Pinang and Singapore—(Steind.).]

Notes on new and rare fishes of the Pacific coast. By **W. N. Lockington**. <Amer. Naturalist, vol. xiv, No. 8, pp. 595–600, August, 1880.

[Remarks on recent discoveries of the writer and Jordan and Gilbert, relative to species of *Sebastichthys*, *Pleuronichthys*, *Lepidopsetta*, *Agonidae*, *Embiotocidae*, *Chiridae*, *Cottidae*, *Icostidae*, &c., &c. *Pleuragrammus* Gill is partly characterized. Measurements of *Torpedo californica* are given.]

On the identity of the genus *Leuryneis*, Lockington, with *Lycodopsis*, Collett. By **Theodore Gill**. <Proc. U. S. Nat. Museum, iii, pp. 247–248, Sept. 4, 1880.

[New combinations—*Lycodopsis pacificus* and *Lycodopsis paucidens*.]

Description of a new Chiroid fish, *Myriolepis zonifer*, from Monterey Bay, California. By **W. N. Lockington**. <Proc. U. S. Nat. Museum, iii, pp. 248–251, Sept. 4, 1880.

[*Myriolepis zonifer* (n. g. and n. s.).]

Description of a new species of ray, *Raia rhina*, from the coast of California. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, iii, pp. 251–253, Sept. 4, 1880.

Description of a new species of *Hemitripter* from Alaska. By **W. N. Lockington**. <Proc. Acad. Nat. Sci. Phila., pp. 233–236 (sig. 16), Sept. 7, 1880.

[The supposed new species is *H. cavifrons*. I have examined the type in the California Academy of Sciences and do not hesitate to state my belief in its identity with *Hemitripter americanus* (Gmel.) Storer.]

Description of a new species of *Catostomus* (*Catostomus cypho*) from the Colorado River. By **W. N. Lockington**. <Proc. Acad. Nat. Sci. Phila., pp. 237–240 (sig. 16), Sept. 7, 1880.

The eulachon or candle-fish of the northwest coast. By **James G. Swan**. <Proc. U. S. Nat. Museum, iii, pp. 257–264, Sept. 15, 1880.

[It is now known that the sand smelt referred to on page 258 is *Hypomesus pretiosus* and not *H. olidus*.]

Descriptions of two new species of fishes, *Ascelichthys rhodorus* and *Scytalina cerdale*, from Neah Bay, Washington Territory. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, iii, pp. 264–268, Sept. 15, 1880.

[*Ascelichthys* n. g. *Cottid*, *Scytalina* n. g. *Congrogadid*.]

Neue Gattungen und Arten von Fischen. Von **Franz Steindachner**. <Anzeig. Akad. Wien, No. xix, pp. 158–159.

[“N. g. *Ptychochromis*, *Ancharius*, *Hypoptichus*, *Neozarces*, mit Diagnosen.”—Zool. Anzeiger, iii, No. 65, p. 460, Sept. 20, 1880.]

Description of two new species of Scopeloid fishes, *Sudis ringens* and *Myctophum crenulare*, from Santa Barbara Channel, California. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, iii, pp. 273–276, Sept. 28, 1880.

Do flying fish fly? By **C. O. Whitman**. <American Naturalist, vol. xiv, No. 9, pp. 641–653, Sept., 1880.

Description of two new species of flounders (*Parophrys ischyurus* and *Hippoglossoides classodon*), from Puget's Sound. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, iii, pp. 276–280, Sept. 28, 1880.

[Definition of genus *Parophrys* modified, page 277.]

## 1880—Continued.

Description of a new sparoid fish (*Sparus brachysomus*), from Lower California. By **W. N. Lockington**. <Proc. U. S. Nat. Museum, iii, pp. 284-286, Sept. 28, 1880.

Description of seven new species of Sebastoid fishes, from the coast of California. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, iii, pp. 287-298, Sept. 28, 1880.

[New species: *Sebastichthys atrovirens*, *rubrivinctus*, *veixillaris*, *chlorostictus*, *constellatus*, *rastrelliger* and *fasciolaris* Lockington (a substitute for *Sebastes fasciatus* Girard, the name *fasciatus* being preoccupied).]

Description of a new Embiotocoid (*Abeoua aurora*), from Monterey, California, with notes on a related species. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, iii, pp. 299-301, Sept. 28, 1880.

[*Ditrema brevipinne* Günther is considered a synonym of *Brachyistius frenatus* Gill.]

Description of a new flounder (*Platysomichthys stomias*), from the coast of California. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, iii, pp. 301-303, Sept. 28, 1880.

[The writers, in a paper written later than the above, but published earlier (*op. cit.*, p. 51), founded the genus *Atheresthes* for this species.]

Description of a new Embiotocoid fish (*Cymatogaster rosaceus*), from the coast of California. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, iii, pp. 303-305, Sept. 28, 1880.

[*Brachyistius frenatus* Gill is referred to the genus *Cymatogaster*.]

Description of a new species of deep-water fish (*Ichthys Lockingtoni*), from the coast of California. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, iii, pp. 305-308, Sept. 28, 1880.

[*Ichthys* n. g., representing a new family, *Ioosteidae*, which is defined on page 307. *Ioosteus* and *Ichthys* compared.]

Description of a new Embiotocoid fish (*Ditrema atripes*), from the coast of California. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, iii, pp. 320-322, Sept. 28-Oct. 27, 1880.

[*Phanerodon* Girard is considered a synonym of *Ditrema*.]

Description of a new Scorpaenoid fish (*Sebastichthys maliger*), from the coast of California. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, iii, pp. 322-324, Oct. 27, 1880.

Note on a new flat-fish (*Lepidopsetta isolepis*), found in the markets of San Francisco. By **W. N. Lockington**. <Proc. U. S. Nat. Museum, iii, p. 325, Oct. 27, 1880.

Note on a forgotten paper of Dr. Ayres and its bearing on the nomenclature of the Cyprinoid fishes of the San Francisco markets. By **David S. Jordan**. <Proc. U. S. Nat. Museum, iii, pp. 325-327, Oct. 27, 1880.

[The paper referred to was published in the "Daily Placer Times and Transcript", issue of May 30, 1854; it determines the nomenclature of *Telestes gibbosa*, *Orthodon microlepidotus*, *Pogonichthys macrolepidotus*, and *Catostomus occidentalis*.]

Description of a new Scorpaenoid fish (*Sebastichthys proriger*), from Monterey Bay, California. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, iii, pp. 327-329, Oct. 27, 1880.

Description of a new Agonoid (*Agonus vulsus*), from the coast of California. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, iii, pp. 330-332, Oct. 27, 1880.

[In a foot-note on page 332, *Agonus (Brachyopsis) Barkani* Steind. is stated to be a synonym of *Brachyopsis verrucosus* Lock., and *Agonus (Brachyopsis) Annæ* Steind. is said to be antedated by *Brachyopsis xyosternus* Jor. & Gilb.]

Description of a new species of *Hemirhamphus* (*Hemirhamphus rosæ*), from the coast of California. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, iii, pp. 335-336, Oct. 27, 1880.

1880—Continued.

Do flying fish fly? By **David S. Jordan**. <Amer Naturalist, vol. xiv, No. 11, pp. 804-805, November, 1880.

[Observations on *Exocoetus californicus* Cooper.]

On the flight of the flying fish. By **C. O. Whitman**. <The Zoologist, London, Third Series, vol. iv, No. 47, November, 1880, pp. 471-481.

[“From the Amer. Naturalist for September. Slightly abridged.”]

Description of a new species of *Notidanoid* shark (*Hexanchus corinus*), from the Pacific coast of the United States. By **David S. Jordan** and **Charles H. Gilbert**. <Proc. U. S. Nat. Museum, iii, pp. 352-355, Nov. 23-Dec. 21, 1880.

[*Hepranchias maculatus*, described on pages 353 and 354, *Somniosus microcephalus*, *Lamna cornubica*, and *Eulamia* sp. are noted as additions to the list of sharks on the Pacific coast.]

An introduction to the Study of Fishes. By **Albert C. L. G. Günther**, M. A., M. D., Ph. D., F. R. S., Keeper of the Zoological Department in the British Museum. Edingburgh, Adam and Charles Black, 1880.

[West coast species are frequently referred to.]

CATALOGUE OF OLD WORLD BIRDS IN THE UNITED STATES  
NATIONAL MUSEUM.

By **ROBERT RIDGWAY**.

The following list includes all the species of extra-American birds at present represented in the collection of the U. S. National Museum, numbered, named, and classified according to Gray's "Hand-list."\*

The object of this list is to render apparent the desiderata of the National Museum in the way of Old World birds, so that museums or individuals desiring to make exchanges may know what species are wanted. Genera and subgenera not now in the collection, are the chief desiderata, and as many as possible of them are desired, especially of forms belonging or nearly related to groups which are represented in the American avian-fauna.

Fam. GYPÆTIDÆ (I, p. 1).

1. *Gypætus barbatus*.

Fam. VULTURIDÆ.

Subfam. VULTURINÆ (I, p. i).

3. *Vultur monachus*.
5. *Otogyps auricularis*.
8. *Gyps fulvus*.
11. *bengalensis*.

Subfam. NEOPHRONINÆ (I, p. 4).

21. *Neophron percnopterus*.

Fam. FALCONIDÆ.

Subfam. BUTEONINÆ (I, p. 6).

36. *Buteo vulgaris*.
38. *plumipes*. (Juv.)

81. *Archibuteo lagopus*.

84. *asiaticus*. (Juv.)

85. *hemilasius*. (Juv.)

Subfam. AQUILINÆ (I, p. 10).

87. *Aquila chrysaetos*.

88. *imperialis*.

91. *clanga*.

92. *nævia*.

99. *Pseudaëtus bonelli*.

100. *Hieraaëtus pennatus*.

119. *Circaaëtus gallicus*.

128. *Spilornis holospilus*.

131. *Pandion haliaëtus*.

139. *Poliornis poliogenys*. (Juv.)

144. *Haliaëtus albicilla*.

146. *Thalassoaëtus pelagicus*. (Juv.)

\* Hand-list of the Genera and Species of Birds, distinguishing those contained in the British Museum. By G. R. Gray, F. R. S., etc., Assistant Keeper of the Zoological Collections. 3 vols. 8vo. London: 1869-1871.



149. *Cuneuma leucogaster*.  
 150.           *vocifer*.  
 153. *Helotarsus ecaudatus*. (Juv.)  
 155. *Haliastur indus*.  
 157.           *sphenurus*.

## Subfam. FALCONINÆ (I, p. 18).

160. *Hierofalco gyrfalco*. (Juv. only!)  
 165. *Falco orientalis*.  
 176. *Gennaia saker*. (Juv.)  
 180. *Hypotriorchis subbuteo*.  
 181.           *lunulatus*.  
 182. *Dissodectes concolor*.  
 192. *Æsalon regulus*.  
 199. *Ieracidea berigora*.  
 200.           *occidentalis*.  
 201. *Harpe novæ-zealandiæ*.  
 203. *Tinnunculus alaudarius*.  
 207.           *newtoni*.  
 209.           *cenchroides*.  
 213. *Erythropus vespertinus*.  
 214.           *amurensis*. (♂ ad.)  
 215. *Tichornis cenchris*.  
 219. *Ierax caeruleescens*.  
 222.           *sericeus*.

## Subfam. MILVINÆ (I, p. 24).

237. *Pernis apivorus*.  
 243. *Milvus regalis*.  
 244.           *govinda*.  
 245.           *migrans*.  
 247.           *ægyptius*.  
 258. *Elanus melanopterus*.  
 261.           *axillaris*.  
 262.           *scriptus*.

## Subfam. ACCIPITRINÆ (I, p. 29).

268. *Astur palumbarius*.  
 276. *Leucospiza novæ-hollandiæ*.  
 277.           *rayi*.  
 299. *Accipter nisus*.  
 327. *Urospiza torquata*.  
 329.           *cirrocephalus*.  
 330.           *approximans*.  
 331.           *rufitorques*. (Type.)  
 342. *Micronisus gabar*.  
 347.           *badins*. (Juv.)

## Subfam. CIRCINÆ (I, p. 36).

356. *Circus ærginosus*.  
 358.           *assimilis*.  
 363.           *jardinii*.  
 364. *Strigiceps cyaneus*.  
 368.           *eincrens*.  
 369. *Glaucopteryx cineraceus*.  
 370.           *pallidus*.

## Fam. SERPENTARIIDÆ (I, p. 38).

375. *Serpentarius reptilivorus*.

## Fam. STRIGIDÆ.

## Subfam. SURNINÆ (I, p. 38).

376. *Surnia ulula*.  
 378. *Athene noctua*.  
 379.           *glaux*.  
 387. *Tænioglaux whitelii*.  
 394. *Microglaux perlata*.  
 396. *Hierocoglaux connivens*.  
 397.           *strenua*.  
 400. *Spiloglaux boobook*.  
 403.           *novæ-zealandiæ*.  
 425. *Ninox scutellata*.  
 433. *Microptynx passerinum*.

## Subfam. BUBONINÆ (I, p. 43).

444. *Huhua orientalis*.  
 440. *Bubo maximus*.  
 454. *Nisulla madagascariensis*.  
 458. *Ketupa flavipes*.  
 459.           *javensis*.  
 461. *Scops zorca*.  
 464.           *sunia*.

## Subfam. SYRNINÆ (I, p. 48).

500. *Syrnium aluco*.  
 503.           *lapponicum*.  
 512. *Ptynx uralense*.  
 513.           *fulvescens*. (Pullus.)  
 514. *Bulaca indranee*.  
 539. *Otus vulgaris*.  
 553. *Phasmoptyx capensis*.  
 554. *Nyctala "funerea L." (= N. teng maimi Gm.)*.

## Subfam. STRIGINÆ (I, p. 52).

558. *Strix flammea*.  
 563.           *delicatula*.  
 564.           *lulu*. (Type.)

## Fam. CAPRIMULGIDÆ.

## Subfam. PODARGINÆ (I, p. 53).

582. *Podargus strigoides*.  
 584.           *megacephalus*.  
 592. *Batrachostomus javanensis*.

## Subfam. CAPRIMULGINÆ (I, p. 56).

612. *Caprimulgus europæus*.  
 614.           *ruficollis*.  
 626.           *albnotatus*.  
 633.           *macrurus*.

## Fam. CYPSELIDÆ (I, p. 63).

717. *Cypselus apus*.



719. *Cypselus melba*.  
 723.           *gallilaensis*.  
 753. *Collocalia spodiopygia*. (Type.)  
 759.           *leucophaea*. (Type.)  
 770. *Hirundapus caudacuta*.

Fam. HIRUNDINIDÆ (I, p. 68).

786. *Hirundo rustica*.  
 795. *Cecropis cucullata*.  
 808. *Lillia rufula*.  
 817. *Hylochelidon nigricans*.  
 872. *Ptyonoprogne rupestris*.  
 880. *Chelidon rubra*.

Fam. CORACIADÆ (I, p. 75).

897. *Coracias garrula*.  
 903. *Eurystomus orientalis*.  
 907.           *pacificus*.  
 910.           *glauca*.

Fam. EURYLAIMIDÆ.

Subfam. EURYLAIMINÆ (I, p. 77).

916. *Eurylaimus javanus*.  
 917.           *ochromelas*.  
 922. *Cymbirhynchus macrorhynchus*.

Subfam. CALYPTOMENINÆ (I, p. 78).

924. *Calyptomena viridis*.

Fam. TROGONIDÆ (I, p. 81).

991. *Harpactes kasumba*.  
 992.           *diardi*.  
 993. *Pyrotrogon ardens*.  
 995. *Duvaucelii rutilus*.

Fam. ALCEDINIDÆ (I, p. 89).

1060. *Dacelo gigas*.  
 1062.           *cervina*.  
 1063. *Choncalcyon gaudiehandi*.  
 1076. *Tanyiptera sylvia*.  
 1077.           *doris*.  
 1085. *Halcyon erythrorhyncha*.  
 1095. *Entomobia smyrnensis*.  
 1096.           *gularis*.  
 1097.           *pileata*.  
 1099. *Calialeyon coromandeliana*.  
 1103. *Cyanaleyon macleayi*.  
 1112. *Sauropatis sancta*.  
 1113.           *vagans*.  
 1116.           *chloris*.  
 1120.           *vitiensis*. (Type.)  
 1130. *Todirhamphus sacra*.  
 1131.           *tuta*.  
 1132.           *venerata*.  
 1133.           *recurvirostris*.  
 1137. *Lacedo pulchella*.

1140. *Syma torotoro*.  
 1141.           *flavivirostris*.  
 1166. *Corythornis cristata*.  
 1175. *Alcyon azurea*.  
 1180. *Ceryle rudis*.  
 1183. *Megaceryle guttata*.

Fam. MEROPIDÆ (I, p. 98).

1194. *Nyctornis amictus*.  
 1196. *Bucia albertoni*.  
 1197. *Meropis gularis*.  
 1201. *Merops apiaster*.  
 1202. *Melittophas bicolor*.  
 1205. *Blepharomerops aegyptius*.  
 1206.           *savignyi*.  
 1207.           *philippinus*.  
 1209. *Aërops albicollis*.  
 1210. *Philostrus viridis*.  
 1217. *Cosmaërops ornatus*.  
 1219. *Sphecochobus angolensis*.  
 1224. *Coccolarynx bullocki*.

Fam. UPUPIDÆ.

Subfam. UPUPINÆ (I, p. 103).

1250. *Upupa epops*.

Subfam. IRRISORINÆ (I, p. 103).

1259. *Irrisor erythrorhynchus*.

Subfam. EPIMACHINÆ (I, p. 104).

1271. *Ptilornis paradisea*.  
 1273. *Craspedophora magnifica*.

Fam. PROMEROPIDÆ.

Subfam. NECTARININÆ (I, p. 106).

1278. *Nectarinia famosa*.  
 1282. *Cinnyris chalybea*.  
 1287.           *osea*.  
 1305. *Chalecomitra amethystina*.  
 1306.           *senegalensis*.

Subfam. PROMEROPINÆ (I, p. 106).

1338. *Promerops cafer*.  
 1353. *Anthobaphes violacea*.

Subfam. ARACHNOTHERINÆ.

1365. *Arachnothera longirostra*.  
 1377. *Arachnorphis chrysogenys*.  
 1394. *Leptocoma hasseltii*.  
 1398. *Anthreptes longuemarii*.

Subfam. DREPANINÆ (I, p. 113).

1405. *Drepanis coccinea*.  
 1406. *Himatione sanguinea*.  
 1407. *Hemignathus lucidis*.  
 1409. *Moho nobilis*.

1412. *Psittirostra psittacea*.  
 1432. *Microchelidon hirundinaceum*.

## Fam. MELIPHAGIDÆ.

## Subfam. MYZOMELINÆ (I, p. 153).

1950. *Myzomela sanguinolenta*.  
 1981. *erythrocephala*.  
 1984. *jugularis*.  
 1992. *nigriventris*. (Type.)  
 2002. *Gliciphila fulvifrons*.  
 2005. *caledonica*.  
 2008. *chlorophæa*.  
 2014. *Acanthorhynchus tenuirostris*.

## Subfam. MELIPHAGINÆ (I, p. 155).

2016. *Meliphaga phrygia*.  
 2017. *Ptilotis lewinii*.  
 2022. *lencotis*.  
 2023. *anricomis*.  
 2027. *penicillata*.  
 2028. *fusca*.  
 2029. *chrysops*.  
 2051. *Foulehaio carunculata*.  
 2052. *procerior*.  
 2053. *Phylidonyris australasiana*.  
 2054. *Meliornis novæ-hollandiæ*.  
 2056. *sericea*.  
 2058. *Prothemadera novæ-seelandiæ*.  
 2059. *Anthornis melanura*.  
 2063. *Anthochara carunculata*.  
 2065. *Anellobia mellivora*.  
 2066. *lunulata*.  
 2067. *Chaoptila angustipluma*.  
 2068. *Leptornis samoënsis*.  
 2072. *Acanthogenys rufogularis*.  
 2080. *Philemon lessoni*.  
 2084. *Tropidorhynchus corniculatus*.  
 2089. *buceroïdes*.  
 2092. *Entomiza cyanotis*.  
 2094. *Manorina melanophrys*.  
 2095. *Myzantha garrula*.

## Subfam. MELITHREPTINÆ (I, p. 161).

2099. *Melithreptus lunulatus*.  
 2100. *brevirostris*.  
 2103. *albogularis*.  
 2107. *Zosterops cærulescens*.  
 2111. *albogularis*.  
 2113. *griseonota*.  
 2114. *xanthochroa*.  
 2124. *japonica*.  
 2133. *madagascariensis*.  
 2142. *flaviceps*. (Type.)  
 2151. *simplex*.  
 —. *minuta* Layard. (Loy-  
 alty Islands )  
 2172. *Orosterops montana*.

## Fam. ANABATIDÆ.

## Subfam. SITINÆ (I, p. 181).

2484. *Sitta casia*.  
 2485. *syriaca*.  
 2502. *Sittella chrysoptera*.  
 2505. *pileata*.  
 2507. *Acanthisitta chloris*.

## Fam. CERTHIIDÆ (I, p. 183).

## Subfam. CERTHIINÆ.

2512. *Certhia familiaris*.

## Subfam. TICHODROMINÆ.

2520. *Tichodroma muraria*.  
 2521. *Climacteris leucophæa*.  
 2523. *scandens*.

## Fam. MENURIDÆ.

## Subfam. MENURINÆ (I, p. 185).

2529. *Menura superba*.

## Subfam. ORTHONYXINÆ (I, p. 185).

2532. *Orthonyx spinicauda*.  
 2534. *Mohona ochrocephala*.

## Fam. TROGLODYTIDÆ.

## Subfam. TROGLODYTINÆ (I, p. 188).

2562. *Troglodytes parvulus*.

## Subfam. TATARINÆ (I, p. 194).

2679. *Tatara longirostris*.

## Fam. LUSCINIDÆ.

## Subfam. MALURINÆ (I, p. 195).

2689. *Orthotomus phyllorrhaphus*.  
 2720. *Drymoipus extensicauda*.  
 2731. *Drymoica maculosa*.  
 2739. *subruficapilla*.  
 2805. *Cisticola schenicola*.  
 2875. *Chthonicola sagittata*.  
 2876. *Malurus cyaneus*.  
 2882. *lamberti*.  
 2887. *dorsalis*.  
 2891. *callanns*.  
 2892. *Stipiturus malachurus*.  
 2903. *Cincloramphus cruralis*.  
 2904. *cantillans*.  
 2905. *Megalurus palustris*.  
 2908. *Sphenæacus africanus*.  
 2910. *pu etatus*.

## Subfam. CALAMODYTINÆ (I, p. 206).

2917. *Calamodyta arundinacea*.  
 2919. *orientalis*.  
 2922. *palustris*.

2926. *Calamodyta cantans*.  
 2940. *Calamoherpe arundinacea*.  
 2953. *Pseudoluscinia luscinoides*.  
 2954. *Cettia sericea*.  
 2964. *Calamodus schœnobæus*.  
 2969. *Luscinola melanopogon*.  
 2972. *Locustella rayi*.  
 2979. *Ædon galactodes*.  
 2988. *Thamnobia fulicata*.  
 2990. *coryphæus*.

Subfam. SYLVIANÆ (I, p. 212).

3001. *Sylvia melanocephala*.  
 3003. *Melizophilus undatus*.  
 3004. *sarda*.  
 3006. *Alsœcus subalpinus*.  
 3007. *conspicillatus*.  
 3012. *Sterparola cinerea*.  
 3013. *curruca*.  
 3016. *Sibilatrix sylvicola*.  
 3017. *Monachus atricapilla*.  
 3019. *rùpellii*.  
 3021. *Adophœus orpheus*.  
 3024. *Philacantha nisoria*.  
 3025. *Epilais hortensis*.  
 3032. *Asilus trochilus*.  
 3033. *bonelli*.  
 3034. *rufa*.  
 3043. *Phyllopneuste polyglotta*.  
 3054. *sylvicultrix*.  
 3057. *brunnea*.  
 3065. *Reguloides proregulus*.  
 3067. *superciliosus*.  
 3100. *Regulus cristatus*.  
 3101. *ignicapillus*.  
 3106. *Sericornis frontalis*.  
 3113. *Acanthiza nana*.  
 3114. *lineata*.  
 3115. *pusilla*.  
 3119. *flavolateralis*.  
 3125. *Geobasileus chrysorrhœa*.  
 3126. *reguloides*.

Subfam. LUSCININÆ (p. 220).

3151. *Luscinia vera*.  
 3152. *philomela*.  
 3153. *Ruticilla phœnicea*.  
 3154. *tithys*.  
 3159. *aurora*.  
 3185. *Nemura cyanura*.  
 3193. *Erythacus rubecula*.  
 3196. *Cyanecula sœcica*.  
 3198. *cœrulea*.  
 3200. *wolfi*.  
 3202. *Calliope camtschatkensis*.

Subfam. SAXICOLINÆ (I, p. 224).

3205. *Saxicola œnanthe*.  
 3206. *albicollis*.  
 3207. *stapazina*.  
 3208. *leucomela*.  
 3250. *Dromolœa leucura*.  
 3274. *Pratincola rubicola*.  
 3275. *rubetra*.  
 3276. *torquata*.  
 3289. *Petroica* "multicolor, Vig. & H."  
       = *P. leggi* Sharpe.  
 —. *multicolor* (Gm.) (Nor-  
       folk I.)  
 3290. *Petroica goodenovii*.  
 3291. *phœnicea*.  
 3294. *pusilla*. (Type.)  
 3298. *Erythrodryas rosea*.  
 3300. *Melanodryas cucullata*.  
 3307. *Myiomoira macrocephala*.  
 3308. *Miro albifrons*.  
 3315. *Origma rubricata*.

Subfam. ACCENTORINÆ (I, p. 230).

3316. *Accentor alpinus*.  
 3324. *Tharrhaleus modularis*.

Fam. PARIDÆ.

Subfam. PARINÆ (I, p. 231).

3328. *Parus major*.  
 3329. *ater*.  
 3333. *Parus minor*.  
 3335. *cinereus*.  
 3348. *Pœcile palustris*.  
 3349. *borealis*.  
 3351. *lugubris*.  
 3352. *cinetus*.  
 3365. *Cyanistes cyaneus*.  
 3366. *cœrulens*.  
 3373. *Lophophanes cristatus*.  
 3395. *Orites caudatus*.

Subfam. ÆGITHALINÆ (I, p. 236).

3416. *Ægithalus pendulinus*.  
 3428. *Pannurus biarmicus*.

Fam. MOTACILLIDÆ.

Subfam. MOTACILLINÆ (I, p. 245).

3562. *Motacilla alba*.  
 3564. *yarrelli*.  
 3566. *japonica*.  
 3567. *hizoniensis*.  
 3569. *maderaspatana*.  
 3570. *dukhunensis*.  
 3573. *capensis*.  
 3576. *ocularis*.

3578. *Budytes flavus*.  
 3579.       *melanocephala*.  
 3580.       *cinereocapilla*.  
 3582.       *rayi*.  
 3583.       *citreola*.  
 3585.       *viridis*.  
 3590.       *flaveola*.  
 3592. *Calobates boarula*.  
 3595. *Grallina picata*.  
 3607. *Ephthianura albifrons*.  
 3608.       *aurifrons*.  
 3609.       *tricolor*.

## Subfam. ANTHINÆ (I, p. 249).

3614. *Anthus spinoletta*.  
 3615.       *obscurus*.  
 3635. *Agodroma campestris*.  
 3640. *Pipastes plumatus*.  
 3645. *Spipola pratensis*.  
 3646.       *cervinus*.  
 3649. *Corydalla richardi*.  
 3652.       *striolatus*.  
 3653.       *malayensis*.  
 3656.       *australis*.  
 3658.       *novæ-zealandiæ*.  
 3661. *Macronyx capensis*.

## Fam. TURDIDÆ.

## Subfam. TURDINÆ (I, p. 253).

3667. *Turdus viscivornis*.  
 3673. *Arcenthornis pilaris*.  
 3674.       *naumanni*.  
 3675.       *fuscatus*.  
 3677. *Hylocichla musica*.  
 3678.       *iliaca*.  
 3687. *Oreocinclu varia*.  
 3689.       *lunulata*.  
 —.       *heinei* Caban. (Australia).  
 3697. *Merula vulgaris*.  
 3698.       *simillima*.  
 3703.       *sinensis*.  
 3709.       *xanthopus*.  
 3710.       *vanikorensis*.  
 —.       *pritzbueri*. (Loyalty Islands.)  
 3715. *Cichloselys cardis*.  
 3720. *Thoracocinclu torquata*.  
 3721. *Cichloides atrogularis*.  
 3723.       *pallidus*.  
 3724.       *chrysolans*.  
 3725.       *olivaceus*.  
 3728.       *rufulus*.  
 3734.       *hortulorum*.  
 3790. *Geocichla citrina*.  
 3800. *Monticola saxatilis*.

3801. *Monticola rupestris*.  
 3805. *Petrocincla cyanea*.  
 3806.       *pandos*.  
 3807.       *solitaria*.  
 3859. *Myiophonus cæruleus*.  
 3862. *Arrenga horsfieldi*.  
 3868. *Bessonornis cafra*.  
 3884. *Copsychus saularis*.  
 3886.       *mindanensis*.  
 3893. *Cercotrichas macrourus*.

## Fam. HYDROBATIDÆ (I, p. 266).

3899. *Hydrobata cinclus*.  
 3902.       *asiatica*.

## Fam. PYCNONOTIDÆ.

## Subfam. PYCNONOTINÆ (I, p. 268).

3916. *Microscelis amaurotis*.  
 3919. *Microtarsus melanoleucus*.  
 3921.       *olivaceus*.  
 3922. *Trachycomus ochrocephalus*.  
 3924. *Pycnonotus capensis*.  
 3926.       *barbatus*.  
 3935.       *brunneus*.  
 3942. *Ixos goiavier*.  
 3948.       *sinensis*.  
 3956.       *chrysorrhoides*.  
 3960. *Otocompser jocosa*.  
 3961.       *pyrrhotis*.  
 3968.       *tympanistrigus*.  
 3972. *Brachypodius melanocephalus*.  
 3973.       *metallicus*.

## Subfam. PHYLLORNITHINÆ (I, p. 272).

3981. *Hypsipetes ganessa*.  
 3987.       *nigerrima*.  
 4048. *Iole olivaceus*.  
 4070. *Phyllornis javensis*.  
 4071.       *cyanopogon*.  
 4074.       *icterocephala*.  
 4079.       *malabarica*.

## Subfam. CRATEROPODINÆ (I, p. 277).

4088. *Pomatorhinus musicus*.  
 4089.       *erythrocnemis*.  
 4097. *Pomatostomus temporalis*.  
 4106. *Malacocircus griseus*.  
 4124. *Cinclosoma punctatum*.  
 4125.       *castanotum*.  
 4126.       *cinnamomeum*.  
 4127.       *castaneothorax*.  
 4154. *Garrulax perspicillatus*.  
 4184. *Petrocyclus carchinans*.  
 4193. *Leucodioptron taiwanus*.  
 4204. *Psophodes crepitans*.

Fam. DICRURIDÆ.

Subfam. DICRURINÆ (I, p. 284).

- 4207. *Dicrurus amictans*.
- 4209.         *bracteatus*.
- 4217.         *furcatus*.
- 4227.         *albirictus*.
- 4241. *Dissemurus brachyphorus*.
- 4249. *Bhringa remifer*.
- 4251. *Chibia hottentotta*.
- 4256. *Melanornis edolioides*.

Subfam. IRENINÆ (I, p. 288).

- 4266. *Irena puella*.
- 4267.         *malayensis*.
- 4268.         *cyanogastra*.

Fam. ARTAMIDÆ.

Subfam. ARTAMINÆ (I, p. 289).

- 4270. *Artamus fuscus*.
- 4274.         *sordidus*.
- 4277.         *personatus*.
- 4278.         *supercilius*.
- 4279.         *leucopygialis*.
- 4280.         *melanoleucus*.
- 4281.         *mentalis*.
- 4289. *Cyanolanius bicolor*.

Fam. ORIOLIDÆ.

Subfam. ORIOLINÆ (I, p. 291).

- 4297. *Sphecothebes maxillaris*.
- 4298.         *flaviventris*.
- 4299. *Oriolus galbula*.
- 4305.         *chinensis*.
- 4319.         *melanocephalus*.
- 4323. *Mimeta viridis*.
- 4324.         *flavocinctus*.

Subfam. PTILONORHYNCHINÆ (I, p. 293).

- 4333. *Sericulus melinus*.
- 4335. *Ptilonorhynchus holosericeus*.
- 4336. *Ailuroedus crassirostris*.
- 4339. *Chlamydera nuchalis*.
- 4340.         *maculata*.

Fam. PITTIDÆ (I, p. 294).

- 4343. *Pitta coronata*.
- 4344.         *molluccensis*.
- 4347.         *strepitans*.
- 4356.         *simillima*.
- 4357. *Melanopitta cucullata*.
- 4359.         *sordida*.
- 4369. *Hydroornis maxima*.
- 4370. *Phœnicocichla granatina*.
- 4378. *Erythropitta erythrogastra*.

Fam. ÆGITHINIDÆ.

Subfam. LEIOTRICHINÆ (I, p. 312).

- 4670. *Leiothrix lutea*.

Subfam. ÆGITHININÆ (I, p. 314).

- 4693. *Timalia nigricollis*.
- 4694.         *maculata*.
- 4727. *Ægithina scapularis*.
- 4729.         *lafresnayi*.
- 4730. *Malacopteron magnus*.
- 4747. *Macronus ptilosus*.
- 4751. *Cacopitta lepidopleurus*.

Fam. MUSCICAPIDÆ.

Subfam. MUSCICAPINÆ (I, p. 319).

- 4786. *Monarcha* "carinata Vig. & Horsf."  
= *M. melanops* Vieill.
- 4807. *Pomarea nigra*.
- 4811. *Muscicapa griseola*.
- 4814.         *hypogrammica*.
- 4821. *Hedymela atricapilla*.
- 4822.         *collaris*.
- 4839. *Erythrosterne parva*.
- 4848. *Zanthopygia narceissina*.
- 4855. *Micreeca fascians*.
- 4878. *Cyornis rubeculoides*.
- 4879.         *bananuas*.
- 4892. *Cyanoptila cyanomelana*.
- 4899. *Stopora albicaudata*.

Subfam. MYIAGRINÆ (I, p. 327).

- 4910. *Seisura inquieta*.
- 4915. *Myiagra rubecula*.
- 4918.         *latirostris*.
- 4922.         *viridinitens*.
- 4924.         *caledonica*.
- 4930.         *azurea*.
- 4935. *Muscitodus rufiventris*.
- 4940. *Platysteira cyanea*.
- 4953. *Rhipidura flabellifera*.
- 4955.         *albiscapa*.
- 4956.         *rufifrons*.
- 4963.         *caniceps*.
- 4973.         *nebulosa*. (Type.)
- ,         *caledonica*. (New Cal-  
edonia.)
- ,         *verreauxi*. (New Cal-  
edonia.)
- ,         *bulgeri*. (New Caldo-  
nia.)
- 4992. *Muscylva lessoni*.
- 4993. *Sauloprocta motacilloides*.
- 4998.         *tricolor*.
- 5005. *Tchitrea melanogastra*.
- 5008.         *ferreti*.
- 5025. *Xeocephalus rufus*.



## Subfam. CAMPEPHAGINÆ (I, p. 334).

5033. *Perierocotus flammens*.  
 5040.           *peregrinus*.  
 5050.           *cinereus*.  
 5051.           *griseigularis*.  
 5054. *Graucalus melanops*.  
 5065.           *parvirostris*.  
 5067.           *mentalis*.  
 5078.           *hypoleuca*.  
 5079.           *"Swainsoni Gould"* (= *G. lineatus* Sw.)

5090. *Gazzola caledonica*.  
 5116. *Lalage humeralis*.  
 5123.           *pacifica*.  
 5128.           *montrosieri*.  
 5133. *Ceblepyris caesia*.

## Fam. LANIIDÆ.

## Subfam. PACHYCEPHALINÆ (I, p. 385).

5828. *Colluricincla harmonica*.  
 5848. *Cracticus robustus*.  
 5851.           *cassicus*.  
 5853. *Bulestes torquatus*.  
 5857. *Falcunculus frontatus*.  
 5859. *Pardalotus punctatus*.  
 5861.           *striatus*.  
 5862.           *affinis*.  
 5871. *Pachycephala gutturalis*.  
 5871.           *melanura*.  
 5872.           *rufiventris*.  
 5887.           *icteroides*. (Type.)  
 5888.           *flavifrons*. (Type.)  
 5890.           *assimilis*.  
 5904.           *albifrons*. (Type.)  
 —.           *littayei*. (New Cal-  
                   edonia.)

5911. *Hylocharis philomela*.  
 5913. *Eopsaltria australis*.  
 5916.           *caledonica*.  
 5918.           *flavigastra*.  
 5926. *Phæornis obscura*.

## Subfam. LANIINÆ (I, p. 390).

5927. *Collyrio excubitor*.  
 5928.           *meridionalis*.  
 5942. *Fiscus collaris*.  
 5947. *Leucometopon nubicus*.  
 5949. *Laniellus shach*.  
 5950.           *erythronotus*.  
 5965. *Enneoctonus collurio*.  
 5966.           *minor*.  
 5970. *Lanius lucionensis*.  
 5971.           *superciliosus*.  
 5972.           *magnirostris*.  
 5978. *Phoneus senator*.

## Subfam. MALACONOTINÆ (I, p. 394).

6009. *Laniarius barbarus*.  
 6043. *Telophorus gutturalis*.  
 6051. *Pomatorhynchus cucullatus*.

## Fam. CORVIDÆ.

## Subfam. STREPERINÆ (II, p. 1).

6058. *Strepera graculina*.  
 6061.           *anaphonensis*.  
 6062. *Gymnorhina tibicen*.  
 6063.           *leucocota*.

## Subfam. GARRULINÆ (II, p. 2).

6070. *Garrulus glandarius*.  
 6073. *Garrulus "melanocephalus Gené."*  
       (= *G. atricapillus* Geoffr.)  
 6082. *Perisoreus infaustus*.

## Subfam. CALLÆATINÆ (II, p. 7).

6141. *Callæas cinerea*.  
 6144. *Struthidea cinerea*.  
 6149. *Dendrocitta sinensis*.  
 6155. *Vagabunda rufa*.

## Subfam. CORVINÆ.

6161. *Nucifraga caryocatactes*.  
 6167. *Pica caudata*.  
 6169.           *media*.  
 6176. *Cyanopollus cyana*.  
 6177.           *cooki*.  
 6181. *Corvus corax*.  
 6185.           *japonensis*.  
 6187.           *culminatus*.  
 6192.           *corone*.  
 6193.           *cornix*.  
 6195.           *australis*.  
 6199.           *umbrinus*.  
 6200.           *ruficollis*. (Type of *C. lep-*  
                   *tonyx* Peale.)  
 6201.           *frugilegus*.  
 6208.           *pastinator*.  
 6223. *Pterocorax torquatus*.  
 6230. *Lycos monedula*.  
 6234. *Anomalocorax splendens*.

## Subfam. PYRRHOCORACINÆ (II, p. 15).

6243. *Pyrrhocorax alpinus*.  
 6244. *Corcorax melanorhamphos*.  
 6245. *Coracia graculus*.

## Fam. PARADISEIDÆ (II, p. 15).

6247. *Paradisea apoda*.  
 6248.           *minor*.  
 6251. *Diphyllodes speciosa*.  
 6252. *Cicinnurus regius*.

Fam. STURNIDÆ.

Subfam. MANUCODINÆ (II, p. 17).

6259. *Manucodia gouldi*.

Subfam. EULABETINÆ (II, p. 18).

6264. *Eulabes religiosa*.

6267. *javanensis*.

6275. *Gymnops tricolor*.

Subfam. STURNINÆ (II, p. 19).

6280. *Pastor roseus*.

6282. *Acridotheres tristis*.

6283. *crisatellus*.

6291. *Gracupica nigricollis*. (Juv.)

6292. *Temnuchus pagodarum*.

6293. *malabaricus*.

6299. *Sturnia sinensis*.

6301. *pyrrhogenys*.

6306. *Sturnus vulgaris*.

6307. *unicolor*.

6309. *cineraceus*.

6316. *Creadion carunculatus*.

6318. *Heterolocha gouldii*.

Subfam. BUPHAGINÆ (II, p. 22).

6319. *Buphaga africana*.

Subfam. JUIDINÆ (II, p. 23).

6328. *Lamprocolius auratus*.

6329. *splendidus*.

6352. *Spreo bicolor*.

6357. *Pyrrhocheira morio*.

6363. *Aplonis tabuensis*.

6364. *cassini*. (Type.)

6367. *atronitens*.

6369. *caledonensis*.

6370. *brevirostris*. (Type.)

6376. *Calornis metallica*.

6388. *atrifusca*. (Type.)

Fam. PLOCEIDÆ.

Subfam. PLOCEINÆ (II, p. 40).

6575. *Oriolinus olivaceus*.

6613. *Plocens philippensis*.

6633. *Oryx capensis*.

Subfam. VIDUINÆ (II, p. 47).

6664. *Videstrela paradisea*.

Subfam. SPERMESTINÆ (II, p. 49).

6685. *Estrela astrild*.

6707. *bengalus*.

6710. *amandava*.

6724. *modesta*.

6725. *ruficauda*.

6740. *phaëton*.

6762. *Munia malabarica*.

6766. *jagori*.

—, *topela* (Hainan).

6767. *Donacola castaneothorax*.

6776. *Padda oryzivora*.

6781. *Lonchura aenticanda*.

6789. *Steganopleura guttata*.

6790. *castanotis*.

6793. *Stictoptera bichenovi*.

6794. *Ægintha temporalis*.

6796. *Zonægius bellus*.

6801. *Amblynura pealei*. (Type of *prasina* Peale.)

6802. *cyanovireus*. (Type.)

Fam. FRINGILLIDÆ.

Subfam. FRINGILLINÆ (II, p. 80).

7166. *Fringilla cœlebs*.

7168. *montifringilla*.

7171. *Carduelis elegans*.

7177. *Chrysomitris spinus*.

7201. ———? *citrinella*.

7203. *totta*.

7206. *Dryospiza serinus*.

7219. *Ligurinus chloris*.

7221. *kawariba*.

7222. *sinica*.

7243. *Petronia diadema*.

7251. *Montifringilla nivalis*.

7257. *Passer domesticus*.

7258. *montanus*.

7269. *italiæ*.

7270. *rufpectus*. (?)

Subfam. COCOTHAUSTINÆ (II, p. 87).

7286. *Cocothraustes vulgaris*.

7287. *japonicus*.

7293. *Eophona melanura*.

Subfam. PYRRHULINÆ (II, p. 99).

7477. *Pyrrhula rubicilla*.

7481. *coccinea*.

7488. *Crithagra butyracea*.

7493. *canicollis*.

7507. *Carpodacus erythrinus*.

7522. *Propasser roseus*.

7523. *Bucanites githagineus*.

Subfam. SPERMOPHILINÆ (II, p. 102).

7529. *Uragus sibiricus*.

Subfam. LOXIANÆ (II, p. 108).

7632. *Loxia curvirostra*.

7633. *pityopsittaca*.

7637. *tæniptera*.

7639. *Pinicola enucleator*.

7645. *Linaria cannabina*.  
 7646.       *flavirostris*.  
 7649. *Ægiothus linaria*.  
 7658. *Leucosticte arctoa*.  
 7659.       *brunneonucha*.

## Subfam. EMBERIZINÆ (II, p. 111).

7675. *Grauativora melanocephala*.  
 7678. *Hypocentor aureola*.  
 7680.       *sulphurata*.  
 7682. *Melophus melanictera*.  
 7683. *Emberiza citrinella*.  
 7684.       *cirrus*.  
 7687.       *hortulana*.  
 7688.       *spodocephala*.  
 7689.       *personata*.  
 7695.       *rustica*.  
 7697.       *miliaria*.  
 7698.       *cia*.  
 7700.       *pithyornus*.  
 7704.       *ciopsis*.  
 7708.       *scheniela*.  
 7709.       *pyrrhuloides*.  
 7716. *Fringillaria capensis*.  
 7719.       *caesia*.  
 7726.       *striolata*.  
 7727. *Plectrophanes nivalis*.  
 7728. *Centrophanes lapponicus*.

## Fam. ALAUDIDÆ (II, p. 116).

7734. *Otocorys alpestris*.  
 7735.       *nivalis*.  
 7737.       *longirostris*.  
 7744. *Alauda arvensis*.  
 7753.       *cælix*.  
 7760. *Lullula arborea*.  
 7762. *Galerida cristata*.  
 7767.       *isabellina*.  
 7775. *Calandrella brachydactyla*.  
 7780. *Melanocorypha calandra*.  
 7786. *Saxilauda calandra*.  
 7794. *Alaemon desertorum*.  
 7815. *Megalophonus apiatus*.

## Fam. COLIDÆ (II, p. 123).

7840. *Colinus capensis*.  
 7844. *Rhabdocolins striatus*.

## Fam. MUSOPHAGIDÆ (II, p. 124).

7850. *Turacus musophagus*.  
 7852.       *persa*.  
 7859. *Schizorhis cristata*.

## Fam. BUCEROTIDÆ (II, p. 127).

7866. *Buceros rhinoceros*.  
 7873. *Hydrocissa convexa*.

7877. *Anorrhinus galeritus*.  
 7879.       *malayanus*.  
 7884. *Hydrocorax planicornis*.  
 7892. *Penelopides panini*.  
 7898. *Tockus nasutus*.  
 7908. *Rhinoplax sentatus*.

## Fam. PSITTACIDÆ.

## Subfam. PEZOPORINÆ (II, p. 136).

7983. *Platyceercus penpanti*.  
 7984.       *adelaidæ*.  
 7988.       *palliceps*.  
 7989.       *browni*. (?)  
 7990.       *eximius*.  
 7994. *Psephotus multicolor*.  
 7996.       *pulcherrimus*.  
 7997.       *hamatonotus*.  
 7999.       *xanthorrhous*.  
 8001. *Barnardius barnardi*.  
 8003.       *semitorquatus*.  
 8004. *Purpureicephalus spurius*.  
 8005. *Polytelis barrabandi*.  
 8006.       *melaoura*.  
 8008. *Aspromictus erythropterus*.  
 8011.       *cyanopygius*.  
 8014.       *amboineusis*. (?)  
 8015. *Pyrrhulopsis personatus*.  
 8016.       *splendens*. (Type.)  
 8017.       *hysginus*.  
 8018.       *tabuensis*. (Type of  
       *atrogularis* Peale.)  
 8019. *Cyanorhamphus novæ-zealandiæ*.  
 8026.       *auriceps*.  
 8033. *Melopsittacus undulatus*.  
 8034. *Euphema pulchella*.  
 8039.       *splendida*.  
 8042. *Pezoporus formosus*.  
 8047. *Urodiscus discurus*. (?)  
 8051. *Palæornis torquatus*.  
 8054.       *purpureus*.  
 8055.       *schisticeps*.  
 8056.       *columboides*.  
 8063. *Belocercus longicaudus*.  
 8065.       *erythrogenys*.  
 8068.       *javanicus*. (?)

## Subfam. LORINÆ (II, p. 151).

8167. *Coriphilus taitianus*.  
 8168.       *smaragdinus*.  
 8169. *Loriculus galgulus*.  
 8172.       *vernalis*.  
 8173.       *indicus*.  
 8184. *Lorius domicella*.  
 8191. *Chalcopsitta ater*.  
 8195. *Vini kuhlii*.

8196. *Vini fringillaceus*.

8198. *Phigys solitarius*.

Subfam. TRICHOGLOSSINÆ (II, p. 155).

8210. *Trichoglossus rubritorquis*.

8211.               *novæ-hollandiæ*.

8214.               *massena*.

8217.               *chlorolepidotus*.

8224. *Ptilosclera versicolor*.

8225. *Nanodes discolor*.

8226. *Glossopsitta concinna*.

8227.               *pusilla*.

8228.               *porphyrocephala*.

8239. *Eclectus linnaei*.

8240.               *rotatus*.

8243. *Muscarinus polychlorus*. (?)

8247. *Tanygnathus lucionensis*. (?)

Subfam. NESTORINÆ (II, p. 158).

8252. *Nestor meridionalis*.

Subfam. PSITTACINÆ (II, p. 159).

8380. *Psittinus incertus*.

Fam. CACATUIDÆ.

Subfam. CACATUINÆ (II, p. 168).

8383. *Calopsitta novæ-hollandiæ*.

8384. *Cacatua hæmathropygia*.

8391.               *galerita*.

8399. *Lophochroa leadbeateri*.

8400.               *sanguinea*.

8401. *Eolophus roseicapillus*.

Subfam. CALYPTORHYNCHINÆ (II, p. 170).

8405. *Calyptorhynchus banksi*.

8408.               *solandri*.

8410.               *funereus*.

8412. *Callocephalon galeatus*.

Fam. STRIGOPIDÆ.

8416. *Strigops habroptilus*.

Fam. CAPITONIDÆ.

Subfam. POGONORHYNCHINÆ (II, p. 172).

8418. *Pogonorhynchus dubius*.

8422.               *torquatus*.

8425.               *leucomelas*.

Subfam. MEGALAIMINÆ (II, p. 173).

8432. *Megalaima virens*.

8433.               *versicolor*.

8435.               *chrysopogon*.

8436.               *mystacophanus*.

8437.               *henrici*.

8438.               *armillaris*.

8442. *Cyanops asiatica*.

8445. *Xantholæma rosea*.

8448.               *hæmacephala*.

8450.               *duvancellii*.

8454. *Chotorea corvina*.

8457.               *caniceps*.

8459.               *viridis*.

8479. *Calorhamphus lathamii*.

8487. *Psilopogon pyrolophus*.

Fam. PICIDÆ.

Subfam. PICINÆ (II, p. 181).

8536. *Picoides tridaactylus*.

8540.               *crissoleucus*. (?)

8541. *Picus major*.

8552. *Dendrodromas leucnotus*.

8555. *Dendrocytes medius*.

8558. *Xylocopus minor*.

8577. *Yungipicus scintilleps*.

8588.               *moluccensis*.

8631. *Reinwardtipicus validus*.

8634. *Dryocopus martius*.

8643. *Chrysocolaptes sultaneus*.

8657. *Mesopicus meistrus*.

8666. *Hemicircus sordidus*.

8667.               *concretus*.

8671. *Gecinns viridis*.

8676.               *guerinii*.

8677.               *canus*.

8682. *Chrysophlegma miniata*.

8686.               *mentalis*.

8687.               *punicea*.

8707. *Thriponax javensis*.

8746. *Brachypternus puncticollis*.

8755. *Gauropicoides rafflesi*.

Subfam. COLAPTINÆ (II, p. 202).

8838. *Meiglyptes tristis*. (?)

8839.               *grammithorax*.

8840. *Micropternus phaeiceps*. (?)

8842.               *brunneus*.

8841.               *squamigularis*.

Subfam. YUNGINÆ (II, p. 204).

8848. *Yunx torquilla*.

Fam. CUCULIDÆ.

Subfam. INDICATORINÆ (II, p. 204).

8854. *Indicator variegatus*.

Subfam. PILENICOPIAININÆ (II, p. 205).

8867. *Rhamphococyx curvirostris*.

871. *Leptogrammus cumingii*.

8873. *Zenelostomus javanicus*.

8881. *Rhododytes diardi*.

8884.               *sumatranus*.

8885. *Rhinortha chlorophæa*.

## Subfam. CENTROPODINÆ (II, p. 212).

8956. *Centrococeyx viridis*.  
 8935.                   *sinensis*.  
 8930. *Nesocentor melanops*.  
 8982. *Polophilus phasianus*.  
 8983.                   *macrourus*.

## Subfam. CUCULINÆ (II, p. 215).

8985. *Cuculus canorus*.  
 9006. *Nicoclarus canorinus*.  
 9007.                   *optatus*.  
 9008.                   *tenuirostris*.  
 9013. *Cacomantis pallidus*.  
 9015. *Ololygon lugubris*.  
 9016.                   *merulinus*.  
 9017.                   *threnodes*.  
 9019.                   *sonneratii*. (?)  
 9020.                   *flabelliformis*.  
 9027.                   *simus*. (Type.)  
 9028.                   *bronzinus*.  
 9042. *Lamprococeyx lucidus*.  
 9060. *Coccytes glandarius*.  
 9061.                   *coromandus*.  
 9069. *Eudynamis malayana*. (?)  
 9070.                   *minaudensis*.  
 9071.                   *cycanocephala*.  
 9072.                   *orientalis*.  
 9077.                   *taitiensis*.  
 9078. *Scythrops novæ-hollandiæ*.

## Fam. COLUMBIDÆ.

## Subfam. TRERONINÆ (II, p. 222).

9090. *Crocopus chlorogaster*. (?)  
 9091. *Osmotreron malabarica*.  
 9095.                   *olax*. (?)  
 9096.                   *viridis*.  
 9102. *Butreron capellei*.  
 9116. *Ptilinopus swainsoni*.  
 9117.                   *ewingi*.  
 9121.                   *perousii*.  
 9122.                   *fasciatus*.  
 9124.                   *greyi*.  
 9131. *Kurutreron purpuratus*.  
 9134.                   *coralensis*. (Type.)  
 9150. *Ramphiculus jambu*.  
 9158. *Lamprotreron superbus*.

## Subfam. COLUMBINÆ (II, p. 228).

9169. *Carpophaga chalybura*.  
 9180. *Globicera microcera*.  
 9183.                   *aurora*. (Type.)  
 9184.                   *vanwycki*. (Type.)  
 9186. *Serresius forsteri*.  
 9187. *Myristicivora bicolor*.  
 9199. *Ducula latrans*. (Type.)

9211. *Ianthœnas vitiensis*.  
 9214.                   *hypoinochroa*.  
 9216.                   *castaneiceps*. (Type.)  
 9217. *Megaloprepia magnifica*.  
 9218.                   *assimilis*.  
 9221. *Hemiphaga novæ-zealandiæ*.  
 9222.                   *spadicea*.  
 9225. *Ptilocolpha griseopectus*.  
 9228. *Leucomelana norfolciensis*.  
 9230. *Lopholaimus antarcticus*.  
 9231. *Columba livia*.  
 9233.                   *schimperi*.  
 9234.                   *intermedia*.  
 9241. *Palumbæna œnas*.  
 9243. *Palumbus torquatus*.  
 9246.                   *elphinstonei*.  
 9286. *Geopelia striata*.  
 9287.                   *tranquilla*.  
 9289. *Erythrauchena humeralis*.  
 9290. *Stictopelia cuneata*.  
 9293. *Macropygia phasianella*.  
 9294.                   *tenuirostris*. (?)  
 9311. *Turtur auritus*.  
 9313.                   *rupicolus*.  
 9315.                   *suratensis*.  
 9316.                   *chinensis*.  
 9317.                   *senegalensis*.  
 9319.                   *cinereus*. (?)  
 9325. *Streptopelia semitorquata*.  
 9328.                   *risoria*.  
 9332.                   *humilis*.

## Subfam. GOURINÆ (II, p. 239).

9413. *Ocyphaps lophotes*.  
 9415. *Chalcophaps indica*.  
 9417.                   *chrysochlora*.  
 9418.                   *stephani*.  
 9427. *Phaps chalcoptera*.  
 9428.                   *elegans*.  
 9431. *Leucosarcia picata*.  
 9432. *Phapitreron leucotis*.  
 9439. *Calœnas nicobarica*.  
 9442. *Phlogenas luzonica*.  
 9446.                   *erythroptera*.  
 9452. *Goura coronata*.

## Fam. DIDUNCULIDÆ (II, p. 248).

9455. *Didunculus strigirostris*.

## Fam. PTEROCLIDÆ.

## Subfam. PTEROCLINÆ (II, p. 249).

9457. *Pterocles arenarius*.  
 9467. *Pteroclorus alchata*.

## Subfam. SYRRHAPTINÆ (II, p. 250).

9471. *Syrrhaptus paradoxus*.



Fam. MEGAPODIDÆ.

Subfam. TALEGALLINÆ (II, p. 254).

9537. *Talegallus lathamii*.

Subfam. MEGAPODINÆ (II, p. 255).

9547. *Megapodius tumulus*.

Fam. PHASIANIDÆ.

Subfam. PAVONINÆ (II, p. 255).

9560. *Pavo cristatus*.

9563. *Polyplectron bicalcaratum*.

9572. *Argusianus giganteus*.

Subfam. PHASIANINÆ (II, p. 257).

9574. *Phasianus colchicus*.

9575.           *torquatus*.

9577.           *versicolor*.

9585. *Chrysolophus pictus*.

9587. *Puerasia macrolopha*.

9589.           *xanthospila*.

9597. *Emplocomus vicilloti*.

9599. *Acomus pyronotus*.

9601. *Gallophasias albocristatus*.

9602.           *leucomelanos*.

9607. *Gennæus nycthemerus*.

Subfam. GALLINÆ (II, p. 261).

9614. *Gallus ferrugineus*.

9616.           *sonnerati*.

9620. *Creagrins varius*. (?)

9621. *Cerionis satyrus*.

Subfam. NUMIDINÆ (II, p. 262).

9629. *Numida meleagris*.

Fam. TETRAONIDÆ.

Subfam. PERDICINÆ (II, p. 263).

9647. *Pternistes nudicollis*.

9652.           *afer*.

9660. *Scleroptera africana*. (?)

9680. *Francolinus vulgaris*.

9681.           *chinensis*.

9688. *Perdix cinerea*.

9705. *Coturnix communis*.

9707.           *coromandelica*.

9708.           *pectoralis*.

9711. *Synoiacus australis*.

9715. *Perdieuia cambayensis*. (?)

9720. *Microperdix erythrorhyncha*.

9721. *Excalfactoria chinensis*. (?)

Subfam. ROLLULINÆ (II, p. 269).

9726. *Rollulus roulroul*.

9727. *Melanoperdix niger*.

Subfam. TURNICINÆ (II, p. 270).

9729. *Turnix sylvatica*.

9743.           *varia*.

9749. *Areoturnix pugnax*.

Subfam. CACCABININÆ (II, p. 274).

9801. *Lerwa nivicola*.

9802. *Caccabis saxatilis*.

9803.           *græca*.

9805.           *chukar*.

9806.           *rufa*.

9811. *Alectoris petrosa*.

9813. *Ammoperdix heyi*.

9815. *Tetraogallus himalayensis*.

Subfam. TETRAONINÆ (II, p. 275).

9819. *Tetrao urogallus*.

9821.           *hybridus*.

9822. *Lyrurus tetrix*.

9832. *Tetrastes betulinus*.

9835. *Lagopus scoticus*.

9837.           *mutus*.

Fam. CASUARIIDÆ.

Subfam. DROMAINÆ (III, p. 2).

9845. *Dromaius novæ-hollandiæ*.

Subfam. CASUARIINÆ (III, p. 2).

— *Casuarius* (undetermined).

Fam. PTERYGIDÆ (III, p. 3).

9853. *Apteryx anstralis*.

9855.           *oweni*.

Fam. OTIDIDÆ (III, p. 7).

9913. *Otis tarda*.

9914. *Tetrax campestris*.

9921. *Choriotis australis*.

9930. *Afrotis afra*.

9937. *Houbara undulata*.

9938.           *macqueeni*.

Fam. CHARADRIIDÆ.

Subfam. CEDICNEMINÆ (III, p. 9).

9939. *Cedicnemis crepitans*.

9947. *Burbinus grallarius*.

9948. *Esacus magnirostris*.

Subfam. CHARADRIINÆ (III, p. 10).

9950. *Vanellus cristatus*.

9953. *Chettusia gregaria*.

9954.           *wagleri*.

9959. *Lobivanellus indica*.

9961.           *lobata*.

9939. *Hoplopterus spinosus*.  
 9976. *Sarciophorus pectoralis*.  
 9978. *Stephanibyx melanopterus*.  
 9982. *Charadrius apriarius*.  
 9984.           *longipes*. (Winter pl. only.)  
 9985.           *fulvus*. (Winter pl. and young only!)  
 9989. *Eudromias moriellus*.  
 9991.           *australis*.  
 9992.           *veredus*.  
 9993. *Cirripidesmus geoffroyi*.  
 9994.           *mongolicus*.  
 9995.           *pyrrhothorax*.  
 9998. *Ægialites hiaticula*.  
 9999.           *fluviatilis*.  
 10000.          *philippinus*.  
 10002.          *tricollaris*.  
 10008.          *nigrifrons*.  
 10013. *Ochthodromus bicinctus*.  
 10014. *Leucopoliis marginatus*.  
 10016.           *kittlitzii*.  
 10020. *Ægialophilus cantianus*.  
 10021.           *ruficapillus*.  
 10024. *Anarhynchus frontalis*.

## Fam. GLAREOLIDÆ.

## Subfam. GLAREOLINÆ (III, p. 17).

10026. *Glareola pratineola*.  
 10031.           *orientalis*.  
 10032. *Stiltia grallaria*.

## Subfam. CURSORINÆ (III, p. 18).

10035. *Pluvianus ægyptius*.  
 10036. *Cursorius gallicus*.

## Fam. CHIONIDIDÆ (III, p. 20).

10056. *Chionis minor*.

## Fam. HÆMATOPODIDÆ (III, p. 21).

10057. *Hæmatopus ostralegus*.  
 ———.           *osculans* Swinh.  
 10062.           *longirostris*.

## Fam. GRUIDÆ (III, p. 24).

10079. *Grus cinerea*.  
 10081.           *monacha*.  
 10091.           *australasiana*.  
 10092. *Anthropoides virgo*.  
 10094. *Balearica pavonina*.

## Fam. ARDEIDÆ.

## Subfam. ARDEINÆ (III, p. 26).

10099. *Ardea cinerea*.  
 10101.           *pacifica*.

10102. *Ardea purpurea*.  
 10108. *Herodias alba*.  
 10110.           *intermedia*.  
 ———.           *modesta*.  
 10113. *Garzetta nivea*.  
 10117. *Demiegretta novæ-hollandiæ*.  
 10120.           *sacra*.  
 10132. *Bubulcus ibis*.  
 10133.           *coromanda*.  
 10134. *Ardeola comata*.  
 10140.           *prasiniicollis*. (Juv.)  
 10146.           *cinnamomea*.  
 10147.           *sinensis*.  
 10148. *Ardetta minuta*.  
 10157. *Butorides javanica*.  
 10160.           *patruelis*. (Type.)

## Subfam. BOTAURINÆ (III, p. 32).

10161. *Botaurus stellaris*.  
 10162.           *poiciloptilus*.  
 10171. *Nyctiardea nycticorax*.  
 10172.           *caledonica*.

## Fam. CICONIIDÆ.

## Subfam. CICONINÆ (III, p. 34).

10184. *Ciconia alba*.  
 10186. *Melanopelargus nigra*.  
 10187.           *episcopus*.

## Subfam. PLATALEIDÆ (III, p. 37).

10199. *Platalea leucorodia*.  
 10203. *Platibis flavipes*.  
 10204. *Spathierodia melanorhyncha*.

## Fam. TANTALIDÆ.

## Subfam. TANTALINÆ (III, p. 35).

10208. *Tantalus ibis*.  
 Subfam. IBIDINÆ (III, p. 38).

10214. *Plegadis falcinellus*.  
 10220. *Carphibis spinicollis*.  
 10221. *Threskiornis æthiopiensis*.  
 10224.           *strictipennis*.

## Fam. SCOLOPACIDÆ.

## Subfam. LIMOSINÆ (III, p. 41).

10239. *Numenius arquata*.  
 10241.           *tenuirostris*.  
 10246.           *tahitiensis*.  
 10249.           *phæopus*.  
 10252.           *luzoniensis*.  
 10254.           *minor*.  
 10257.           *femoralis*. (Type.)  
 10258. *Limosa ægocephala*.  
 10259.           *lapponica*.

10261. *Limosa uropygialis*. (= 10262.)  
 10262.           *novæ-zealandiæ*.  
 10265. *Therekia cinerea*.

Subfam. TOTANINÆ (III, p. 44).

10266. *Totanus stagnatilis*.  
 10267. *Helodromas oebrophus*.  
 10268. *Rhyacophilus glareola*.  
 10270. *Heteroscelus incanus*.  
 10272. ———? *calidris*.  
 10275. *Erythrosceles fuscus*.  
 10276. *Glottis canescens*.  
 10279. *Tringoides hypoleucus*.  
 10283. *Tryngites cancellata*. (Types of  
           *parvirostris*, Peale.)

Subfam. RECURVIROSTRINÆ (III, p. 47).

10285. *Recurvirostra avocetta*.  
 10287.           *rubricollis*.  
 10291. *Cladorhynchus pectoralis*.  
 10292. *Himantopus autumnalis*.  
 10295.           *leucocephalus*.  
 10296.           *novæ-zealandiæ*.

Subfam. TRINGINÆ (III, p. 48).

10299. *Philomachus pugnax*.  
 10304. *Limnocinclus acuminatus*.  
 10305. *Limicola platyrhyncha*.  
 10310. *Schœniclus cinclus*.  
 10311. *Actodromas minuta*.  
 10313.           *salina*.  
 10314.           *australis*.  
 10315. *Leimonites temmincki*.  
 10319. *Ancylocheilus subarquata*.  
 10323. *Enrinorhynchus pygmaeus*.

Subfam. SCOLOPACINÆ (III, p. 51).

10328. *Gallinago major*.  
 10329.           *scolopacina*.  
 10330.           *macroactyla*.  
 10331.           *australis*.  
 10341.           *nemorica*.  
 10342.           *gallinula*.  
 10343.           *solitaria*.  
 10344.           *horsfieldi*.  
 10347.           *aucklandica*. (Types of  
           *holmesi*, Peale.)  
 10352. *Scolopax rusticola*.  
 10353.           *saturata*.  
 10356. *Rhyuchæa capensis*.  
 10357.           *bengalensis*.  
 10358.           *australis*.

Fam. RALLIDÆ.

Subfam. OCYDROMINÆ (III, p. 56).

10363. *Ocydromus australis*.  
 10365.           *earlei*.

10375. *Hypotaenidea torquata*.  
 10377.           *philippensis*.  
 10378.           *striata*.  
 10390. *Rallina fasciata*.  
 10391.           *fusca*.  
 10395.           *rubiginosa*. (?)  
 10401.           *minahasa*. (?)

Subfam. RALLINÆ (III, p. 58).

10408. *Rallus aquaticus*.  
 ———.           *indicus*.  
 10450. *Ortygometra crex*.  
 10451. *Porzana marnetta*.  
 10452.           *novæ-hollandiæ*.  
 10461. *Zapornia pygmaea*.  
 10462.           *minuta*.  
 10463.           *tabuensis*.  
 10464.           *quadristrigata*.

Fam. GALLINULIDÆ.

Subfam. PORPHYRIONINÆ (III, p. 64).

10476. *Porphyrio veterum*.  
 10478.           *melanotus*.  
 10481.           *indicus*.  
 10484.           *vitiensis*. (Types.)

Subfam. GALLINULINÆ (III, p. 66).

10495. *Gallinula chloropus*.  
 10496.           *tenebrosa*.  
 ———.           *sandwichensis* Streets.  
 10508. *Erythra phœnicura*.  
 10511. *Gallierex cristata*.

Subfam. FULICINÆ (III, p. 67).

10513. *Fulica atra*.  
 10514.           *australis*.  
 10519.           *alai*. (Types.)  
 10521. *Lupha cristata*.

Fam. PARRIDÆ (III, p. 69).

10537. *Metopodius albinucha*.  
 10538.           *indica*.  
 10539. *Hydroleator cristata*.  
 10540. *Hydrophasianus chirurgus*.

Fam. PHŒNICOPTERIDÆ (III, p. 72).

10544. *Phœnicopterus antiquorum*.

Fam. ANATIDÆ.

Subfam. PLECTROPTERINÆ (III, p. 73).

10552. *Anseranas melanoleuca*.  
 10555. *Sarkidiornis melanonota*. (♀)  
 10557. *Chenalopex ægyptiaca*.

Subfam. ANSERINÆ.

10561. *Anser cinereus*.  
 10563.           *segetum*.

10535. *Anser albifrons*.  
 10568. *Marilochen erythropus*.  
 10574. *Cygnopsis cygnoides*.  
 10577. *Chlamidochen jubata*.  
 10582. *Leucopareia sandwichensis*.  
 10596. *Anserella albigennis*.

## Subfam. CYGNINÆ (III, p. 78).

10597. *Cygnus olor*.  
 10600. *Olor cygnus*.  
 10605. *Chenopsis atratus*.

## Subfam. ANATINÆ (III, p. 79).

10608. *Dendrocygna arcuata*.  
 10611.           *major*. (?)  
 10617. *Leptotarsis eytoni*.  
 10618. *Tadorna cornuta*.  
 10620. *Stictonetta naevosa*.  
 10621. *Casarea rutila*.  
 10622.           *tadornoides*.  
 10623.           *variegata*.  
 10627. *Aix galericulata*.  
 10628. *Mareca penelope*.  
 10631.           *punctata*.  
 10646. *Anas luzonica*.  
 10647.           *superciliosa*.  
 10648.           *chlorotis*. (♀ juv. only.)  
 10656. *Querquedula ciria*.  
 10651. *Nettion crecca*.  
 10663.           *gibberifrons*. (?)<sup>\*</sup>  
 ———.           *eytoni*. (Kerguelen Isl-  
                     and.)  
 10671. *Eunetta falcata*.  
 10672.           *formosa*.  
 ———. *Chaulelasmus couesi* Streets.  
           (Types.)  
 10675. *Marmonetta angustirostris*.  
 10677. *Spatula rhynchotis*.  
 10681. *Malacorhynchus membranaceus*.

## Subfam. FULIGULINÆ.

10683. *Fuligula rufoa*.  
 10684. *Fulix cristata*.  
 10689. *Aythya ferina*.  
 10693. *Nyroca leucopthalma*.  
 10694.           *australis*.  
 10710. *Oidemia nigra*.  
 10714. *Melanetta fusca*.

## Subfam. ERISMATURINÆ (III, p. 89).

10716. *Biziura lobata*.  
 10718. *Erismatura leucocephala*.

## Subfam. MARGINÆ (III, p. 91).

10734. *Mergellus albellus*.

## Fam. PODICIPIDÆ (III, p. 92).

10793. *Podiceps cristatus*.  
 10740.           *australis* (= 10793)  
 10747. *Pedeithya griseigena*.  
 10751. *Dytes auritus*.  
 10753. *Proctopus nigricollis*.  
 10763. *Sylbeocyclus minor*.  
 10766.           *novæ-hollandiæ*.

## Fam. SPHENISCIDÆ (III, p. 98).

10796. *Pygoscelis papua*.  
 10801.           *antipoda*.  
 10803. *Dasyrhamphus adeliæ*.  
 10805. *Eudyptila minor*.

## Fam. PROCELLARIDÆ.

## Subfam. PELECANOIDINÆ (III, p. 102).

10825. *Pelecanoides urinatrix*.

## Subfam. PROCELLARINÆ (III, p. 102).

10386. *Puffinus assimilis*.  
 ———.           *nativitatus* Streets. (Type:  
                     Christmas Island.)  
 10852. *Procellaria nercis*.  
 10861. *Oceanites lineata*. (Type.)  
 10864. *Pelagodroma fregata*.  
 10868. *Fregetta melanogaster*.  
 10876. *Priocella antarctica*.  
 10881. *Æstelata lessoni*.  
 10882.           *rostrata*. (Type.)  
 10884.           *incerta*.  
 10889.           *parvirostris*. (Type.)  
 ———.           *kidderi* Cones. (Type: -  
                     Kerguelen Island.)  
 10893. *Cookilaria cooki*.  
 10897.           *mollis*. (Type.)  
 10902. *Halobæna caerulea*.  
 10903. *Pagodroma nivea*.  
 10907. *Pterodroma macroptera*.  
 10915. *Majaqueus æquinoctialis*.  
 10921. *Pseudoprius turtur*.

## Subfam. DIOMEDEINÆ (III, p. 109).

10925. *Diomedea exulans*.  
 10929. *Thalassarche melanophrys*.

## Fam. LARIDÆ.

## Subfam. LARINÆ (III, p. 111).

10905. *Larus canus*.  
 10953. *Dominicanus vociferus*.  
 10959. *Clupearus fuscus*.  
 10969. *Laroides californicus*.  
 10974.           *michahellesii*. (Juv.)  
 10977. *Blasipus crassirostris*.

\* From New Zealand = *A. gracilis* Buller.





chin and throat indistinctly streaked with dingy whitish and dusky, while the jugulum and entire sides are dark slate, very much darker than in the other specimens, only the centre of the abdomen being whitish. Some of the feathers of the breast show indistinct whitish shaft-streaks, while the entire under surface is pervaded by a greater or less amount of fuliginous wash. The entire upper parts are a perfectly uniform black, the other specimens having a decidedly slate-colored cast. The bill and feet of this specimen still retain their brilliant hue, the entire mandible and edges of the maxilla being an intense orange-red, while the legs and feet are a deep orange-yellow color. The collector's notes upon the label are as follows: "Iris white; bill orange-red, with upper mandible black; tarsi and feet orange-yellow".

This specimen was obtained at Cuscu, La Palma, September 25, 1881, by Mr. Juan Cooper.

2. *Thryothorus hyperythrus* Salv. & Godm. (Biolog. Centr.-Am. Aves, i, p. 91).

A single specimen from Carrillos, Alajuela (October, 1879; Juan Cooper), agrees exactly with examples from Veragua and Panama.

3. *Troglodytes* (?) *ochraceus*, sp. nov.

SP. CH.—Above bright tawny-brown, duller posteriorly, the forehead and lores more ochraceous; a very conspicuous superciliary stripe of bright ochraceous, most distinct posteriorly by reason of its strong contrast with a broad post-ocular stripe of dusky brown. Entire side of head (except as described), with whole lower parts, bright tawny-ochraceous, paler, but by no means inclining to white, on the throat and abdomen (the last deep buff). Remiges and wing-coverts narrowly barred or vermiculated with dusky, their inner webs uniformly of this color; tail dull brown, narrowly and irregularly barred, or vermiculated, with dusky. Crissum bright ochraceous-buff with a few rather indistinct bars of dusky. Lining of wing plain pale ochraceous; inner webs of remiges edged with grayish white. Wing, 1.80; tail, 1.25; culmen, .65; tarsus, .70; middle toe, .50. 3d, 4th, and 5th quills equal and longest; 2d equal to 7th; 1st much shorter than the secondaries (.60 shorter than longest primary). Tail graduated, lateral feather .25 or .30 shorter than middle pair; rectrices very narrow. Culmen regularly and very decidedly curved from the base.

Type, No. 85547, coll. U. S. Nat. Mus. Volcan de Irazú, Costa Rica, October 10, 1880; Juan Cooper.

This diminutive and very pretty Wren is very different both in proportions and coloration from any other species with which I am acquainted. In size it is about equal to *Anorthura troglodytes*, but it is otherwise not to be compared with that species, the bill being more curved than in any other member of the group that I have seen (except, perhaps, *Uropsila leucogastra*, of which the only specimen of which, that I have been able to examine, has the bill broken). It is with consider-

able doubt that I refer it to *Troglodytes* at all, and I do so only because I do not know where else to place it, while I am reluctant to institute a new genus for its special reception. Comparing it with specimens of typical *Troglodytes* (*T. aëdon*, *T. furrus*, *T. tessellatus*, *T. brunneicollis*, &c.), *Anorthura troglodytes*, and *Uropsila leucogastra*, I find that it agrees best with the latter in pattern of coloration and in general form, but the wing is much less rounded, the tarsi shorter, and the nostrils very different; those of *Uropsila* being (in the specimen before me) broadly oval, with very little membrane above them, while the present bird has a narrow, longitudinal or slit-like nostril overhung by a broad scale. I am inclined to believe, however, that extreme caution is necessary in using the shape of the nostril in dried skins as a generic character, since its external appearance is so easily modified by accidental circumstances attending the preparation of a specimen. For the present, therefore, I refer the species to *Troglodytes*, and leave further consideration of the question of its generic relationship in abeyance.

As to the coloration of this species, it is most like *T. brunneicollis*, but the tint which prevails over the entire lower parts and the greater part of the head in *T. ochraceus* is decidedly brighter and more yellowish than the light rufous color of *T. brunneicollis*, which, moreover, has this color restricted to the throat, jugulum, and breast. Furthermore, in *T. ochraceus* there is not the slightest indication of bars or other markings on the sides or flanks.

### Genus ACANTHIDOPS, nobis.

(Ἀκανθίτης, ἴδος = *Acanthis*, and ὤψ = *facies*.)

GEN. CH.—Most nearly related to *Automolus*, *Placellodromus*, and allied genera in structure of the feet, &c., but very different in form of bill, and other characters. Bill about as long as the middle toe, cuneate in all its profiles, somewhat swollen basally, the culmen and lateral outlines decidedly concave in the middle portion; mandibular tomia very strongly inflexed, with a prominent angle near the base, anterior to which the edge is decidedly concave; maxillary tomia with a decided notch near the base, immediately above the mandibular angle; gonys very long (about equal to the exposed portion of the culmen); nostrils exposed, small, longitudinal, occupying less than the lower half of the nasal fossæ. Tarsus a little longer than the middle toe and claw, divided into about six plates, but these entirely fused on the outer side, except the lower one, which is distinct; lateral toes equal, the points of their claws falling short of the base of the middle claw; inner toe entirely separated at the base from the middle toe, and outer with only its first phalanx united; hallux about equal in length to the lateral toes, but much stronger, its claw decidedly larger than that of the middle toe.

Wings decidedly longer than the tail, very concave beneath, the 3d, 4th, and 5th quills nearly equal and longest, the 2d very little shorter, the 1st about equal to the 7th. Tail about equal to the wing measured to the ends of the secondaries, nearly even or very slightly rounded, consisting of twelve rectrices, which are acute but not stiffened at the points; the outer web of the *intermediae* broader at the base than the inner web.

Type, *A. bairdi*, sp. nov.

This remarkable genus is so very distinct from any other hitherto described that it is quite difficult to decide where to place it. It evidently belongs, however, to the Synallaxine group, on account of the structure of the feet, but the bill is so widely different from that of any other member of the family ("*Dendrocolaptidae*") as to suggest certain Fringilline forms, as *Carduelis* and *Chrysomitris*. In fact, the bill is so similar in form to that of the genera named that the collector had referred it to the latter genus.

As characters additional to those given in the above diagnosis, it may be stated that the bill is slightly notched near the tip; that the rectal bristles are so minute as to be hardly perceptible, and that the posterior face of the tarsus, on both sides, is entirely undivided, in which latter respect the present bird differs from *Synallaxis* and *Placelodromus*, but agrees with *Automolus*.

#### 4. *Acanthidops bairdi*, sp. nov.

SP. CH.—♀ (*adult?*): Above dull olive-brown, the back washed with rusty; wings dusky, the middle and greater coverts tipped with pale rusty, forming two distinct bands, the inner secondaries broadly edged with darker rusty; remaining secondaries narrowly skirted with dark umber-brown, the primaries with light, dull ochraceous or yellowish olive. Tail dusky, the outer webs slightly greenish olivaceous. Pileum indistinctly streaked with dusky; sides of the head and neck dull olivaceous, lighter than the crown and nape; chin and throat still paler, the feathers pale ashy beneath the surface; rest of lower parts dull, light olivaceous, tinged with deeper olive across the breast and along the sides. Maxilla blackish, paler along the edge; mandible whitish; legs and feet light brownish (in dried skin); "iris pale blue." Wing, 2.50; tail, 2.20; culmen, .58; commissure, .65; tarsus, .80; middle toe, .60.

Type, No. 85549, coll. U. S. Nat. Mus., Volcan de Irazú, Costa Rica, Oct. 10, 1880; Juan Cooper.

#### 5. *Nyctibius jamaicensis* (Gm.) Gosse.

Two very fine specimens, both females, from Sarchi, Alajuela (altitude 3,000 feet), August and September, 1881, agree with examples from Colombia and Eastern Peru, in rich dark colors. The two skins differ much in proportions, however, though evidently both adults; and after comparing with a considerable series of specimens from Jamaica, Mirador

(Eastern Mexico), Panama, Bogota, and Eastern Peru, I am unable to detect differences other than what appear to be chiefly of an individual character, though there is much variation both in size and colors among the different specimens.

**DESCRIPTION OF A NEW FLY-CATCHER AND A SUPPOSED NEW PETREL FROM THE SANDWICH ISLANDS.**

**By ROBERT RIDGWAY.**

*Chasiempis sclateri*, sp. nov.

SP. CH.—Above dull ferruginous, more nuber on the back, more rufescent on the rump and upper tail-coverts; sides of head and neck, chin, throat, and breast bright ochraceous-rufous; rest of lower parts pure white, the sides tinged with rufous; wings and tail dusky, the middle and greater coverts tipped with pale ferruginous, producing two distinct bands; secondaries edged with pale dull rusty; inner webs of rectrices (except middle pair) tipped with white, this about .40 of an inch wide on the lateral pair and decreasing in extent toward the inner feathers. Wing, 2.70; tail, 2.70–2.75; tarsus, .95–1.00; middle toe, .45.

Types, Nos. 41955 and 41956, coll. U. S. Nat. Mus., Waimea Kauai, Sandwich Islands; V. Knudsen.

Although I have been unable to compare the specimens described above with either *C. sandwichensis* (Gm.) or *C. dimidiata* (Hartl. & Finsch), I am satisfied, from reference to the descriptions of these in Sharpe's catalogue of the *Muscicapidae* ("Catalogue of the Birds in the British Museum," vol. iv), pp. 231–233, that it is quite distinct specifically. The former is described as having the "wing-coverts black, tipped with white spots," the "under wing-coverts white," the cheeks and throat white, the tail only 2.15 inches in length, and the tarsus only .85 long; while the latter is still more different both in proportions and colorations.

*Cymochorea cryptoleucura*, sp. nov.

SP. CH.—*Adult*: Uniform fuliginous, the head and upper surface more slaty, the greater wing-coverts and outer webs of tertials paler, inclining to dull ash-gray; remiges and rectrices dull black, the latter (except middle pair) white at the base; upper tail-coverts white, the longer feathers broadly tipped with blackish (as in *Procellaria pelagica*); anal region mixed with white, and white of the upper coverts extending laterally to the sides of the crissum. Tail only slightly forked or emarginated, the outer feathers being only about .20–.30 of an inch longer than the middle pair. Bill, legs, and feet (including webs) deep black; wing, 5.80–6.30; tail, 3.00–3.15; bill (measured in straight line from base of culmen to point of the maxilla), .60; tarsus, .85–.90; middle toe, with claw, .85–.90.



*Hab.*—Waimea Kau, Sandwich Islands (V. Knudsen). (Types, Nos. 41949 and 41950, coll. U. S. Nat. Mus.)

This fourth species of *Cymochorea* is very different from *C. leucorrhoa* (the only other having white on the tail-coverts), in several very important particulars, as follows: (1) The upper tail-coverts are pure white, terminated by a band of black .35-.50 of an inch wide; (2) the rectrices (except the middle pair) are distinctly white at the base, though this white is concealed by the coverts; (3) the greater wing-coverts and outer webs of the tertials are much darker, offering less decided contrast with the general color of the wings; (4) the tail is much less deeply forked, the depth of the fork not exceeding .30 of an inch, whereas in *C. leucorrhoa* it amounts to about .75 of an inch. In other respects the two species are much alike.

This bird is a true *Cymochorea*, having very prominent nasal tubes, the outer toe longer than the middle, the tarsus about equal to the middle toe (with claw), and the first primary shorter than the fourth as in the typical species of that genus.

#### DESCRIPTIONS OF THIRTY-THREE NEW SPECIES OF FISHES FROM MAZATLAN, MEXICO.

By DAVID S. JORDAN and CHARLES H. GILBERT.

During the fall and winter of 1880-'81, Mr. Gilbert spent ten weeks at Mazatlan, on the west coast of Mexico, in making collections of fishes for the United States National Museum. One hundred and seventy species were obtained, of which the following appear to be new to science:

- |                                     |                                       |
|-------------------------------------|---------------------------------------|
| 1. <i>Clupea stolifera</i> .        | 18. <i>Lutjanus prieto</i> .          |
| 2. <i>Pristigaster lutipinnis</i> . | 19. <i>Micropogon ectenes</i> .       |
| 3. <i>Stolephorus ischanus</i> .    | 20. <i>Sciaenops icistia</i> .        |
| 4. <i>Stolephorus lucidus</i> .     | 21. <i>Scarus perrico</i> .           |
| 5. <i>Stolephorus exiguus</i> .     | 22. <i>Pomacanthus crescentalis</i> . |
| 6. <i>Stolephorus curtus</i> .      | 23. <i>Gobiosoma zebra</i> .          |
| 7. <i>Stolephorus miarchus</i> .    | 24. <i>Gobiosoma cos</i> .            |
| 8. <i>Synodus seipuliceps</i> .     | 25. <i>Gobiosoma erythrops</i> .      |
| 9. <i>Muraena pinta</i> .           | 26. <i>Gobiosoma adustus</i> .        |
| 10. <i>Muraena pintita</i> .        | 27. <i>Gobiosoma zosterurum</i> .     |
| 11. <i>Ophichthys xysturus</i> .    | 28. <i>Clinus zonifer</i> .           |
| 12. <i>Ophichthys zophochir</i> .   | 29. <i>Tripterygium carminale</i> .   |
| 13. <i>Muraenesox coniceps</i> .    | 30. <i>Salarias chiostictus</i> .     |
| 14. <i>Atherinella eriarcha</i> .   | 31. <i>Fierasfer arexicola</i> .      |
| 15. <i>Caranx rinctus</i> .         | 32. <i>Etropus crossotus</i> .        |
| 16. <i>Serranus calopteryx</i> .    | 33. <i>Malthe elater</i> .            |
| 17. <i>Lutjanus colorado</i> .      |                                       |



1. *Clupea stolifera*, sp. nov. (28125.)

Allied to *Clupea lile*, C. & V.

Body deep, much compressed; the dorsal outline with a slight curve; ventral outline more strongly arched; body deepest immediately before dorsal fin. Head short, preopercular margin subvertical; opercle but little oblique, evenly curved. Mouth very small, oblique; maxillary reaching to below front of pupil; lower jaw longer than the upper, which is scarcely emarginate; tip of lower jaw not reaching level of upper profile of snout. Both jaws with a few very small, weak, deciduous teeth; none on vomer or palatines; tongue with a very distinct linear patch. Gill-rakers slender and numerous, the longest about three-fifths diameter of orbit; about 29 on anterior limb of arch. Eye large, longer than snout and more than one-third length of head.

Dorsal fin inserted anteriorly, its origin nearer end of snout than base of caudal, by a distance equalling one-half length of head; the first long rays are much longer than base of fin, which is about three-fifths length of head. Anal fin short and low; distance of its origin from base of caudal equals height of body. Caudal scarcely longer than head, the lower lobe longer than the upper. Pectorals reaching two thirds distance to root of ventrals,  $1\frac{1}{2}$  in head. Ventrals inserted nearly under first dorsal ray, their length  $1\frac{2}{3}$  in head.

Scales smooth, firm, closely adherent, their edges entire; a very narrow sheath of scales along bases of dorsal and anal fins; caudal fin scaled for one-half its length. Ventral scutes very strongly developed, running from thorax to front of anal, the posterior with strong spines; 17 in front of ventral fins, 12 behind them.

Head,  $4\frac{1}{2}$  in length to base of caudal; depth,  $3\frac{1}{2}$ . D. 14; A. 16; L. lat. 40; L. transv. 11.

Color translucent; sides with silvery luster; each scale on back with marginal half black-punctate; a dark line along median line of back, becoming distinctly blackish on tail; snout greenish above, its tip and the end of the lower jaw dusky; a very bright, well-defined, silvery band along sides (as in *Atherina* and *Stolephorus*), margined above with a narrow bluish line; this band is constantly widest at middle of body, tapering slightly towards head and caudal peduncle, abruptly expanding at the end of the latter and covering nearly the entire breadth of the end of the tail. The width of this band is just the depth of one scale, a little more than the depth of the pupil. Dorsal and caudal fins light yellowish-green, the tips of anterior rays of dorsal and of upper and lower caudal lobes usually jet-black. The base of each anal ray marked by black dots. Paired fins immaculate.

Many specimens of this beautiful, well-marked species were obtained at Mazatlan, where it is very common. It does not reach a greater length than 5 or 6 inches, and usually escapes through the coarse meshes of the fishermen's seines.

The numerous types of *C. stolifera* are numbered 28125 on the register of the National Museum.

2. *Pristigaster lutipinnis*, sp. nov. (28126, 28-09, 28320.)

Body elongate, very strongly compressed, especially towards ventral outline; profile nearly straight from origin of dorsal to occiput, where it forms a slight angle; head small, its upper outline but little descending, the lower rapidly rising. Mouth large, very oblique, the lower jaw longest, its tip almost entering upper profile of head; maxillary reaching to or slightly beyond vertical from anterior margin of pupil, its length a little more than half head. Teeth large, in a single series in each jaw; in the upper jaw numerous and comparatively close-set, in the lower few and distant, but considerably larger; margin of maxillary with minute, close-set teeth; palatines and pterygoids toothed, vomer smooth. Eye very large, much longer than snout, and more than one-third length of head. Gill-rakers not longer than pupil, about 18 in number; pseudobranchiae developed.

Dorsal small, posterior, its origin constantly slightly nearer base of caudal than occiput. Pectorals long, not nearly reaching vent, slightly shorter than head. Anal shorter than in other species, its origin midway between middle of caudal base and front of eye, its base contained  $2\frac{3}{4}$  in body; anterior anal rays highest, a little longer than eye. Lower caudal lobe longest.

Scales thin, very readily deciduous; ventral scutes very strong, running from throat to origin of anal fin. D. 13; A. 53; L. lat. 44; L. tr. about 11; ventral scutes, 29; head,  $4\frac{1}{2}$  in length; depth,  $3\frac{1}{2}$ .

Color: Greenish-olive above, on sides silvery with a tinge of yellow; a small black spot on upper angle of preopercle, and a larger very distinct black humeral spot; a black line along dorsal ridge; end of snout and tip of lower jaw black. Anal and caudal golden yellow on basal portions, the tips transparent, dotted with black; pectorals and dorsal with a yellow blotch on middle of first rays, sometimes largely yellow.

This species is rare at Mazatlan and but few specimens were obtained. It is very closely related to *P. macrops* and *P. dovii*, differing from them chiefly in the fewer rays and backward position of the anal fin. The types are about 6 inches long and are numbered 28126, 28203, and 28320 in the United States National Museum.

3. *Stolephorus ischanus*, sp. nov. (28246.)

Closely related to *Stolephorus browni*.

Body elongate, little compressed and scarcely elevated, nearly as high at nape as at front of dorsal; belly compressed, its edge usually rounded. Head long and slender, its height at occiput but little greater than half its length; opercular margin very oblique, forming a more or less evident angle at junction with subopercle; cheeks triangular, moderately broad; opercle short. Maxillary slender, tapering to a blunt point, not quite reaching opercular margin; teeth small, evident for entire length of both jaws, those near symphysis of lower jaw slightly enlarged. Gill-rakers numerous, of moderate length,

the longest about two-thirds diameter of orbit. Snout long, about three-fourths length of orbit, which is large and contained three and three-fourths times in length of head. Dorsal fin with upper margin straight, the posterior rays not prolonged; origin of dorsal about equidistant from base of median caudal rays and front of orbit. Origin of anal under base of posterior dorsal rays, midway between front of orbit and tip of caudal; its base very short, less than two-thirds length of head. Caudal very short, much less than length of head, the lower lobe the longest. Pectorals broad and short, not nearly reaching base of ventrals, which reach about one-half distance to front of anal. Scales thin, moderately deciduous.

Head,  $3\frac{3}{4}$  in length; depth, 5; eye,  $3\frac{1}{2}$  in head. D. 13; A. 16; Lat. l.  $39+2$ ; L. tr. 7.

Color: Translucent, with silvery luster; a sharply-defined, bright silvery band on sides, broadest opposite middle or end of anal, and tapering each way; the streak is confined to a single series of scales (being distinctly narrower than in *S. browni*); sides of head bright silvery; top of head blackish above orbits; two large, well-defined clusters of black dots behind occiput, one on each side of median line; between dorsal and occiput from one to three series of scales black margined; behind dorsal the median series only thus margined. Median line of back with a black streak the entire length; tip of snout, median line of head anteriorly, and region behind orbits black-specked.

This species is very common in the harbor at Mazatlan, reaching a length of  $2\frac{1}{2}$  to 3 inches. The types are numbered 29246 U. S. Nat. Mus. This is apparently the species recorded by Steindachner from the west coast of Mexico as *Engraulis browni*. The latter species has a deeper body, distinctly broader silvery stripe, and a larger number (19-20) of rays in the anal fin.

#### 4. *Stolephorus lucidus*, sp. nov. (28121.)

Body closely compressed but not greatly elevated, the dorsal outline with a very weak arch; belly more-curved, carinate in front of anal fin, but not serrate. Head short, rather pointed, the margin of opercle and subopercle forming an even curve which is but little oblique.

Maxillary narrow, pointed, reaching to or slightly beyond mandibular joint, but not to gill-opening; teeth very evident along entire length of maxillary and mandible, becoming larger towards symphysis of lower jaw; snout short, projecting, about one-half diameter of orbit, which is about one-third length of head; cheeks oblique, V-shaped, the length more than half head; opercle moderate; gill-rakers not very numerous and rather short, the longest not more than one-half diameter of orbit.

Origin of dorsal fin midway between base of middle rays of caudal and front of orbit; upper margin of dorsal straight, the last rays not prolonged. Dorsal much higher than long, its base equaling about one-

half head. Origin of anal under middle of dorsal, its base a little longer than head. Caudal short, the lower lobe longer than the upper; the median rays about one-third the longest. Pectorals three-fifths length of head, nearly or quite reaching base of ventrals, which are short and do not reach the vent. Scales moderately adherent; dorsal sheath very low; that of anal fin higher.

D. 12; A. 27; Lat. l.  $36 + 2$ ; L. transv. 6. Depth,  $3\frac{3}{4}$  in body; head,  $3\frac{1}{2}$ ; eye, 3 in head; B. 11-12.

Color: Body translucent; scales with a silvery luster; dorsal region much punctate with black and with some yellow speckling which broadly covers the margins of the scales; a distinct dark median line, composed of minute dark specks, along entire length of back; sides with a rather diffuse silvery band, broadest anteriorly, becoming very narrow on caudal peduncle, then expanding to base of fin; it covers less than one row of scales, and is narrower than diameter of orbit; top of head, symphysis of lower jaw, and snout, with much black speckling, the snout yellowish; anal fin thickly speckled at base; anterior rays of dorsal and anal, and lower rays of caudal, with some faint greenish-yellow and more or less black dotting; tip of caudal blackish, more distinctly so at end of lobes.

Common in the harbor of Mazatlan and called *Sardina* in common with the other species of this genus, and *Clupea stoliifera*. It reaches a length of 4 to 5 inches. The many types are numbered 28121 in the United States National Museum.

5. *Stolephorus exiguus*, sp. nov. (28120.)

Allied to *S. curtus*, but with much slenderer body and shorter anal fin.

Body not greatly compressed and not elevated; belly compressed, subearinate, serrulate; head rather short, its height at nape more than two-thirds its length; opercular margin not much oblique; cheek narrowly triangular; snout longer than two-thirds diameter of orbit; eye large, three and one-fourth in head; maxillary tapering to an acute point, reaching to or nearly to opercular margin; teeth present in both jaws; in the lower minute and developed on anterior half only; in upper jaw small, but easily perceptible. Gill-rakers short, the longest not more than one-half diameter of orbit.

Origin of dorsal fin midway between base of median caudal rays and middle of pupil; base of fin but little more than one-half length of head. Origin of anal under anterior third of dorsal fin; its base about four-fifths length of head. Caudal short, not nearly equaling length of head. Pectorals not nearly reaching ventrals.

Scales very deciduous.

D. 12; A. 17; L. lat. 38; L. transv. 5. Head,  $3\frac{3}{4}$  in length; depth, 5.

Color translucent; scales with silvery luster; a faint silvery streak along sides, widest and most distinct posteriorly, becoming faint anteriorly, and usually disappearing before reaching head. Scales on back



with dotted margins, no median dark line on back; sides of head bright silvery; top of head dusky posteriorly; caudal and dorsal fins dotted with black, these dots forming two faint blotches at base of caudal; a series of black dots between anal and caudal fins.

About 10 specimens were obtained in the Astillero at Mazatlan, the largest  $2\frac{1}{2}$  inches long. It is apparently less abundant than the other species of this genus in company with which it is found.

The types are numbered 28120 on the register of the National Museum.

6. *Stolephorus curtus*, sp. nov. (29242.)

Body more compressed and elevated than in *S. ischanus*; dorsal outline nearly straight, the ventral scarcely curved except anteriorly; caudal peduncle deep; belly in front of ventral fins sharply compressed, carinate and serrulate. Head short and high, its depth at occiput sevenths its length; snout blunt, not much produced; tip of lower jaw in front of eye; maxillary tapering to a sharp point, which usually does not quite reach gill-opening; both jaws with very minute teeth, perceptible towards symphysis of lower jaw, but not laterally. Opercle shortish; cheeks broadly triangular. Gill-rakers on upper limb longest, about two-thirds diameter of orbit. Eye large, contained  $2\frac{3}{4}$  to  $3\frac{1}{4}$  times in length of head.

Origin of dorsal fin midway between base of middle rays of caudal and middle of pupil; the fin short and rather high, its base but little more than one-half length of head; the last rays not produced. Origin of anal fin under middle or anterior third of base of dorsal; the base of the fin moderate, varying from nearly as long as, to a little longer than, head. Caudal short, less than length of head; the lower lobe longest; the fin moderately forked; the middle rays about two-fifths the length of the longest. Pectorals very short and rounded, variable in length, but usually not reaching base of ventrals. Scales thin, caducous.

D. 11 or 12; A. 22 or 23; L. lat. 35; L. transv. 5. Head,  $4\frac{1}{5}$  in length; depth,  $4\frac{2}{3}$ .

Color translucent; sides with a silvery luster; top of head dusky; sides of head and a faint streak along sides of body with silvery pigment; the streak is somewhat indistinct, especially forwards, where it often disappears; basal half of dorsal fin punctate with black and yellow dots; a double series of these dots along base of fin, running back to base of caudal; caudal not black margined; base of anal thickly punctate, a series of dots usually extending back to caudal fin; paired fins immaculate; tip of snout yellowish, without black specks; no dark line in front of dorsal fin.

Many specimens  $2\frac{1}{2}$  inches long were obtained at Mazatlan, where it is common in the muddy waters of the Astillero. The types are numbered 29242 on the register of the National Museum.



7. *Stolephorus miarchus*, sp. nov. (28119.)

A slender species, distinguished by the very small anal fin. Known to us from immature specimens only.

Body very slender, not strongly compressed (perhaps becoming deeper with age); belly not trenchant. Snout sub-conic, compressed. Teeth rather large, distinct in both jaws; maxillary reaching to edge of preopercle. Lower jaw much overlapped by the snout, its tip extending little in front of the eye, which is not especially large.

Insertion of dorsal fin midway between snout and caudal; anal fin extremely short, its first ray inserted under last of dorsal, the length of its base less than that of the caudal peduncle behind it. Scales lost.

Color perfectly translucent in life, with a diffuse silvery lateral shade, but no distinct stripe; clusters of dark points on occiput; base of caudal with dark markings above and below formed of dark points; the entire fin speckled; a small black streak on each side of ventrals; black points at the base of each fin ray.

Head,  $4\frac{1}{2}$  in length; depth, 6.

Dorsal with about 12 rays (11 to 13); anal, 12 to 14.

This species is known to us from eight specimens (28119 U. S. Nat. Mus.), the largest  $1\frac{3}{4}$  inches in length, killed by dynamite cartridges in deep water in the harbor of Mazatlan, where they were exceedingly abundant. They are, of course, immature, but the species to which they belong will be known from all others by the short anal.

8. *Synodus scituliceps*, sp. nov. (28392, 29449.)

Allied to *S. fætens* L., but with a much smaller head.

Body slender, subterete, less depressed than in *S. fætens*. Head very short and slender, its length above not greater than greatest depth of body. Snout pointed, triangular, about as broad as long. Interorbital space slightly concave, about as broad as eye; a longitudinal ridge on each side of its middle, which sends out radiating branches opposite posterior part of eye; preopercle somewhat raised above eye, its margin somewhat serrate; maxillary extending much beyond orbit, its length  $1\frac{2}{3}$  in head; lower jaw a trifle shorter than upper, its symphyseal knob scarcely included. Teeth essentially as in *S. fætens*, the bands, perhaps, a little narrower; palatine teeth forming a very narrow band, which becomes posteriorly a single series. Gill-rakers undeveloped. Branchiostegals, 14. Cheeks with four rows of large scales; opercles with four.

Distance from origin of dorsal fin to adipose fin equal to the distance from the former to the middle of orbit; origin of dorsal nearer to end of snout than to base of caudal by a distance equal to  $\frac{2}{3}$  head.

Dorsal fin much higher than long, the first and last rays coterminous when the fin is deflexed. Caudal well forked, the upper lobe the longer,  $1\frac{1}{3}$  in head; the middle rays scarcely more than one-third the length of the outer. Ventral fins long and pointed, their length scarcely more than half the distance from their base to front of anal,  $1\frac{1}{4}$  in head.

Pectorals short, their length just about half head, equal to length of snout and eye.

Scales comparatively large; 5 series between lateral line and ventrals; 4 between adipose fin and lateral line. Scales of breast little reduced; 11 between the bases of the two pectorals.

Head,  $4\frac{2}{5}$  in length (4 in *S. fætens*),  $5\frac{1}{5}$  including caudal; greatest depth,  $6\frac{3}{5}$ . D. 11; A. 13. Scales, 6-61-6.

Color in life, brownish-olive above, white below; each scale of back with one or more paler flecks; top and sides of head marbled; lower jaw sometimes marked with darker. Pectorals and caudal mostly blackish; adipose fin black, with a pale border; ventrals and anal immaculate. No yellow in life.

Two specimens of this species were obtained, one  $7\frac{1}{2}$  inches long (28392) from the harbor of Mazatlan, the other 7 inches long (29449) from Panama. The species is much like the *S. fætens* of the Atlantic Coast, but may be readily known by the small head and the somewhat larger scales. *Synodus fætens* has been recorded from Panama, by Dr. Günther, but the reference is probably to *S. scituliceps*.

9. *Muræna pinta*, sp. nov. (28238, 28177, 28338, 28197, 29608, 29359.)

Allied to *Muræna lentiginosa* Jenyns.

Body rather stout and compressed. Teeth all comparatively small, subequal, everywhere uniserial; those of the vomer developed only posteriorly and smaller than the others. Two anterior teeth of mandible larger than the other teeth, but hardly canine-like. Lateral teeth of both jaws rather narrow, sharp, directed a little backwards, those of lower jaw smallest. Mouth not closing completely. Jaws about equal. Anterior nostril with the tube two-thirds diameter of eye; tube of posterior nostrils nearly as long as pupil. Cleft of mouth  $2\frac{2}{5}$  in head. Gill opening longer than eye. Eye  $2\frac{1}{3}$  in snout, a little nearer tip of snout than angle of mouth. Head  $2\frac{2}{5}$  in trunk. Tail a very little longer than rest of body. Dorsal well elevated, beginning in front of gill-opening.

Color rather dark olivaceous-brown above, belly slightly paler, everywhere covered with round or horizontally-oblong light yellow spots, each surrounded by a wide black border. On the body these spots are placed with some regularity; the larger ones, which are a little larger than the pupil, are arranged in 5 or 6 horizontal rows, those of each row being connected by dark streaks two-thirds as wide as their diameter; between the larger streaks are numerous small ones, some of them mere points; all except the very smallest are surrounded by darker rings, and none are indistinct or confluent. The spots are rather larger and brighter and more crowded on the belly than on the back, where the ground color occupies more of the surface than the spots; towards the head the spots become closer together and rather smaller, and on the anterior and lower parts of the head the ground color is reduced to mere reticulations around the spots. Space about gill-opening dusky

Fins colored like the region to which they belong; the dorsal anteriorly with a median row of oblong spots.

The specimen described (No. 28238 U. S. Nat. Mus.) is 18 inches long.

This species is very abundant among the rocks in the harbor of Mazatlan, where numerous specimens were obtained. It is known to the Mexican fishermen as *Anguila pinta*. (From the Latin *puncta*, *i. e.*, punctate.) Another specimen (29359) was obtained by Lieutenant Nichols at San Josef Island.

10. *Muraena pintita*, sp. nov. (28311 U. S. Nat. Mus.)

Subgenus *Gymnothorax*; allied to *Muraena doria* Günther, but differing in color and proportions.

Tail longer than body, by about two-thirds the length of the head; distance from snout to anterior edge of gill-opening contained  $2\frac{3}{5}$  times in length of trunk. Eye above middle of cleft of mouth; diameter of orbit slightly less than half length of snout. Cleft of mouth rather more than two-fifths length of head. Teeth all uniserial; those in sides of lower jaw small, compressed, directed backward, of nearly equal size, some of the posterior larger than the anterior; front of lower jaw with 4 to 6 moderate, movable canines. Sides of upper jaw with some fixed canines among the smaller teeth; premaxillaries with two rather small movable canines; four small conical teeth in front. Vomer with two large movable canines, distant from each other, the posterior the larger. Mouth capable of being nearly closed.

Tubes of anterior nostrils short, scarcely equaling half the diameter of orbit. Posterior nostrils without tubes. Gill-slit one-third wider than orbit. Dorsal fin beginning much in front of gill-slit.

Coloration: Chestnut-brown; upper parts of body and tail with numerous yellow non-ocellated dots, the largest much smaller than pupil, most of them being minute dots. Dorsal colored like the back. Anal plain brown, becoming darker posteriorly. Head without spots; longitudinal furrows under throat, black.

A single example, 19 inches in length, was taken among the rocks near Mazatlan; the species is called *Anguila pintita* by the fishermen.

11. *Ophichthys xysturus*, sp. nov. (28142, 28247, 29642.)

Subgenus *Pisodontophis*; allied to *O. maculosus* (Cuv.).

Teeth all more or less blunt and granular; a band of three or four series, on each side of lower jaw; a band of two rows, on each side of upper jaw; vomer with a long series divided into two for about half its length. Anterior nasal tubes conspicuous, turned downward. Eye  $2\frac{1}{2}$  in snout; front of eye above middle of gape, the length of which is a little more than one-third of head; the angle of mouth well behind eye. Interorbital width about  $\frac{2}{3}$  length of the rather long and slender snout, which projects much beyond lower jaw, the tip of the latter about reaching middle of snout.

Length of head contained  $4\frac{1}{2}$  times in that of the trunk; head and trunk together shorter than tail, and contained  $2\frac{1}{2}$  to  $2\frac{1}{2}$  times in total length. Pectoral very small, its length about equal to depth of gill-opening. Dorsal beginning close behind nape, much in front of gill-opening; fins low; tail pointed, the tip sharp.

Color light olive; sides each with three series of large round brown spots, those of the two upper series of equal size, those of lower scarcely half as large, faint, and often obsolete anteriorly; the spots irregular in their arrangement, those of the upper series usually twice as numerous as those of the next; those of the upper series along base of dorsal fin extending partly on the base of the fin; lower series of spots along base of anal, some of them extending on the fin or even entirely upon it; on the belly are sometimes small dark spots scarcely arranged in series. Dorsal fin with a terminal series of dark spots, which are partly confluent, the fin narrowly margined with white. Anal reddish, with a lighter margin. Pectoral with a blackish blotch. Head covered with round black spots, which become smaller and more numerous towards the snout. Lower jaw with dark spots. Iris light yellow.

Several specimens, from 1 to 2 feet in length, were obtained.

12. *Ophichthys zophochir*, sp. nov. (28280, 28277, 29220, 29239.)

Allied to *Ophichthys parilis* (Richardson) Günther.

Cleft of mouth wide, the snout much overlapping the lower jaw; length of gape from tip of snout to angle of mouth contained  $2\frac{2}{3}$  times in length of head. Teeth small, sharp, subequal, in two somewhat irregular rows on each of the dentigerous bones; points of the teeth directed backwards; no canines; patch of vomerine teeth long, the two series converging backwards. Eye large, its diameter two-thirds the inter-orbital width, which is slightly less than length of snout. Anterior pair of nostrils at end of anterior third of snout, in a short tube, which is less than one-third diameter of orbit and widened at tip. Posterior nostrils large, below the anterior margin of the orbit, not tubular, but the margin with free dermal flaps.

Gill-opening one-third wider than eye, its upper edge slightly above middle of base of pectoral; length of slits slightly greater than the isthmus between them.

Tail long, very nearly twice as long as rest of body. Length of head contained  $2\frac{1}{2}$  times in that of trunk.

Pectoral fin well developed, its length  $2\frac{1}{2}$  in length of head, in adults; proportionally longer in the young. Dorsal fin beginning slightly in advance of tip of pectorals, well developed, the rays distinct. Tip of tail finless, moderately acute.

Color olive brown, becoming paler on sides, whitish below; snout and mandible blackish, yellowish brown anteriorly; mandible with a series of black pores below; throat yellowish, the color extending up on the opercles. Pectoral blackish, its base pale. Anal with the distal half black. Dorsal with a broad black margin. Length about two feet.



This species is rather common in the rocks about Mazatlan, where it is known to the fishermen as "*Anguila blanca*." Several specimens are in the collection.

13. *Muraenesox coniceps*, sp. nov. (28136, 28141, 28212.)

Body compressed, stoutish, head twice in length of trunk. Snout slender, conical, rather pointed, nearly half longer than broad at front of eyes, the distance between anterior nostrils less than half its length; cleft of mouth from tip of snout  $2\frac{1}{2}$  in length of head; upper jaw projecting beyond the lower; teeth all erect, not very large or sharp and without evident basal lobes; teeth in jaws small, compressed, blunt, triserial, those in the inner series much the largest; teeth in outer series very small and blunt; teeth in front of jaws largest, sharp, forming small canines which are shorter than the pupil; about 23 large teeth in each side of lower jaw; middle series of vomerine teeth compressed, without basal lobes, about ten in number; the outer teeth blunt, much smaller. Both nostrils without tubes, the anterior with a narrow free rim. Eye large, 2 in snout,  $1\frac{1}{2}$  in interorbital width, its front much nearer angle of mouth than tip of snout; anterior nostril nearer tip of snout. Gill-opening beginning below upper edge of pectoral, its length greater than the distance between the two openings. Dorsal beginning above gill-opening, moderately high, its longest rays equal to length of eye and snout. Tail about one-third longer than head and body. Pectorals nearly as long as head, a little longer than cleft of mouth from tip of upper jaw. Lateral line very distinct.

Clear olive brown above, dull whitish below with olive tint; dorsal olive brown; anal dusky; both fins with a black margin becoming wider posteriorly; the caudal nearly uniform black; pectorals black, light olive at base; iris grayish silvery.

This species is not very common among the rocks in Mazatlan Harbor, and is not distinguished by the fishermen by any peculiar name. It reaches a length of three feet, and, in common with the other species at Mazatlan, is occasionally eaten but not highly valued. The specimen here described (No. 28136 U. S. Nat. Mus.) is about 2 feet long. This species was also obtained at Panama.

14. *Atherinella eriarcha*, sp. nov. (29243.)

Body comparatively deep, deepest at base of pectorals, strongly compressed. Head short, less compressed than the body, the snout very short, blunt, and rounded in profile; maxillary very slender, almost reaching the vertical from anterior margin of pupil; cleft of mouth oblique, curved, the lower jaw included. Eye very large,  $2\frac{1}{2}$  in head in the type specimen. Premaxillaries very protractile, narrow. Teeth in a narrow band in each jaw, rather strong, recurved; none on vomer or palatines. Gill-rakers long and slender.

First dorsal very short, its origin slightly behind origin of anal; of three very slender weak spines. Space between first and second dorsal



three fifths length of head. Second dorsal beginning over middle of anal, terminating slightly in advance of its last ray; the first rays highest. Origin of anal considerably nearer snout than base of caudal. Base of anal oblique, the anterior rays much highest, the posterior very short. Caudal deeply forked. Ventrals short, not reaching front of anal. Pectorals very broad and short, slightly falcate, scarcely longer than distance from snout to posterior margin of pupil.

Scales adherent, with entire edges.

Color transparent, with a wide, very sharply-defined, silvery band along sides, margined above by a narrow dark line; this band abruptly constricted near the middle of the caudal peduncle and again widened at base of tail into a silvery blotch without dark edging; opercles and branchiostegals silvery; lips punctulate with black dots; silvery peritoneum showing through walls of abdomen; caudal dusted with black; a black point at base of each dorsal and anal ray.

Head, 4 in length; depth,  $4\frac{1}{3}$ .

D. III-I, 12; A. I, 27; Lat. l. 36; L. trans. 7.

We refer this species to the genus *Atherinella* of Steindachner, without raising the question of the distinction of the latter group from *Atherina* proper. *Atherinella eriarcha* is known to us from a single young specimen (No. 29243 U. S. Nat. Mus.),  $2\frac{1}{8}$  inches in length, found in a rock pool at Mazatlan. It is distinguished from *A. panamensis* Steind. by numerous characters, notably the much longer anal and shorter pectoral fins.

15. *Caranx vinctus*, sp. nov. (28365, 28366.)

Allied to *C. eibi* Poey.

Body elongate, elliptical, compressed, upper profile evenly arched from snout to caudal peduncle, the lower nearly rectilinear from snout to origin of anal fin; upper profile slightly carinate anteriorly. Width of cheek about equal to diameter of eye. Mouth moderately oblique, the jaws subequal, the lower scarcely included; intermaxillaries anteriorly about on a level with axis of body, just below level of lower margin of eye; maxillary reaching vertical from front of orbit, 3 in head; teeth very small, blunt, in a narrow band in each jaw, becoming a single series in sides of mandible; the outer series slightly enlarged; teeth on vomer, palatines, and tongue similar to those on jaws. Gill-rakers very long, numerous; the longest, two-thirds diameter of orbit, their number about 10-27. Eye large, less than length of snout, about equaling interorbital width, 4 in head. Adipose eyelid moderately developed. Preopercle with its posterior margin very oblique, the angle broadly rounded. Pre-orbital thin, its least width three-fifths diameter of orbit.

Spinous dorsal well developed, the spines high and flexible; the antrorse spine well developed; the fourth spine the longest, the fifth but little shorter; those posterior rapidly decreasing; the fourth spine equals two-fifths length of head; length of longest dorsal ray less than one-half

length of head. Anal spines strong; the soft rays a little lower than those of dorsal. Soft dorsal and anal entirely received within a membranaceous scaly sheath, which is two-fifths the height of the median dorsal rays, and terminates before the ends of the fins, leaving the last two rays free; the two fins not falcate, the rays regularly decreased from the first. Pectorals very long, falcate, reaching much beyond the origin of the anal, and to the twelfth lateral scute; the fins one-third length of body. Ventrals reaching to or slightly beyond the vent, which is nearly equidistant from their inner axil and from second anal spine. Caudal lobes not falcate, the upper slightly the longer, a little less than length of head.

Lateral line with a strong curve anteriorly, the width of which is less than one-half the straight portion; the depth of the curve about one-fourth its width. Plates very strongly developed, extending the whole length of straight portion of lateral line, which begins under first dorsal rays. Top of head. opercles, jaws, and preorbital scaleless or with a very few scattering scales; cheeks scaly, breast entirely covered with fine scales; membrane of caudal fin with series of scales.

D. VIII-1, 24; A. II-I, 19; Lat. 1. 48. Head  $3\frac{1}{2}$ ; depth 3.

Color dusky-bluish above, silvery below, with golden and greenish reflections; eight or nine vertical dark half-bars descend from back to below lateral line, the widest about equaling diameter of orbit, and more than twice as wide as the light interspaces; breast blackish; head dusky; end of snout black; a distinct black blotch on upper angle of opercle. Fins somewhat dusky; pectoral without spot; anal white at tip.

Common at Mazatlan, but not one of the most abundant fishes. Numerous specimens are in the collection.

16. *Serranus calopteryx*, sp. nov. (28123.)

Allied to *Serranus scriba* (L.), but with shorter soft dorsal.

Body elliptical, little elevated, the dorsal outline gently arched. Snout sharp; lower jaw distinctly longest; maxillary reaching vertical from middle of pupil, or beyond; interorbital space somewhat concave and ridged. Teeth small, cardiform, two small canines in front of lower jaw; four in front of upper jaw; the inner series of teeth somewhat enlarged, containing 2 or 3 large fixed canines in the middle of sides of lower jaw, these larger than the canines in front. Strong teeth on vomer and palatines. No supplemental maxillary bone. Gill-rakers short, few in number, about 8 in all. Preopercle nearly evenly rounded, the posterior margin nearly vertical and, as well as the angle, very finely, evenly, and sharply serrated, the serræ on angle scarcely larger; the lower limb nearly entire. Opercle ending in three compressed spines, the middle the largest, the membrane extending much beyond them.

Scales well ctenoid, on cheeks small, in about 11 rows; opercles with about 4 series of large scales; jaws and top of head naked.

Spinous dorsal low, not notched, the first two spines shorter than the others, which are of equal length and shorter than the soft rays; length of spines about equaling distance from snout to middle of eye, 3 in head. Soft dorsal elevated, the anterior rays somewhat shorter than the posterior, the tips of which reach rudimentary caudal rays,  $2\frac{1}{5}$  in head. Anal spines short and strong, the middle one stronger and slightly longer than the third; the second about equal to dorsal spines; anal rays more elevated than those of dorsal, the last ray the longest and about equal to two-thirds length of head. Ventrals reaching vent; pectorals slightly beyond it, two-thirds length of head; ventrals inserted in front of axil of pectorals. Caudal short, somewhat lunate, with the outer rays produced; the fin  $1\frac{2}{5}$  in head. Dorsal and anal scaleless.

Head  $2\frac{5}{6}$  in length; depth  $3\frac{1}{2}$ . D. X, 12; A. III, 7; scales 5-50-15.

Color: Body light olivaceous, the dorsal region with about 12 broad dark brown cross-bands extending from back to below lateral line, where they are interrupted, to reappear on the level of base of pectorals as a series of roundish blotches; those in front pinkish, behind brown. A light streak from nape to front of dorsal, with two parallel ones (usually indistinct) on each side of it. The brown bar immediately behind soft dorsal is replaced by the ground color, but the corresponding brown spot on sides is present. A brownish streak from snout through eye to upper angle of opercle, clear brown anteriorly; suborbital light blue, with a narrow median streak of clear brown; numerous clear brown blotches on top of head. Base and axil of pectorals largely pink, the fin very finely barred (vermiculated) with pink and light blue. Dorsals reddish, with a median light streak, which disappears posteriorly on soft dorsal; distal part of soft dorsal with numerous small dark brown spots, becoming light pink posteriorly and alternating with similar spots of whitish or light blue. A dark brown spot at base of ventrals; one below base of pectorals, and one in front of the latter at margin of gill-opening. Caudal brown at base and on outer rays, pink on inner rays, vermiculated with irregular narrow light blue lines. Anal and ventrals light glaucous blue, thickly marked with brownish-yellow spots.

Five or six specimens of this species were taken in a seine in the Astillero (estuary), at Mazatlan.

17. *Lutjanus colorado*, sp. nov. (28386, 28305, 28261, 28383.)

Body comparatively deep, highest at front of spinous dorsal, and with an angle at origin of soft dorsal. Profile of back evenly arched to origin of dorsal fin; ventral outline rectilinear to origin of anal fin, the base of which fin is very oblique in the young, less so in the adult.

Snout rather short, less acute than in *L. prieto*, less than one-third length of head. Maxillary reaching nearly or quite to vertical from front of pupil,  $2\frac{3}{4}$  in head. Width of cheek from orbit to angle of preopercle

less than snout. Eye, in adult, half the interorbital width and two-fifths length of snout, proportionately larger in the young. Vertical margin of preopercle with minute, even, serrations for its entire length. A shallow emargination above the angle, which is provided with coarser, but still inconspicuous, serrations; lower limb of preopercle smooth on its anterior half.

Upper jaw with a very narrow band of villiform teeth, behind the conical teeth, which are not very large. A single pair, or more usually two unequal pairs, of canines in front of upper jaw, between which is a pair of small teeth. Conical teeth in lower jaw larger than those of upper, close-set, largest in the middle of the jaw, becoming smaller in front and behind; about 8 on each side. Vomerine teeth arranged in a crescent-shaped patch, without backward extension on the median line. Teeth on tongue in two patches, a roundish one anteriorly, usually formed by the junction of three smaller ones, and an oblong patch on the median line behind this.

Gill-rakers distant, few, the longest half length of orbit, their number about  $1+7$ .

Dorsal spines strong, the fourth the longest, the last more than half its length; the fourth spine  $2\frac{3}{4}$  in head, as long as the snout in the adult, a little longer in young. Soft dorsal and anal similar to each other, some of the posterior rays of each being considerably elevated, the fin thus being pointed instead of rounded in outline. In the young these rays are much longer than the dorsal spines and slightly longer than the caudal peduncle. In the adult they are lower but still longer than the dorsal spines. Longest rays of anal about half head.

Caudal not deeply emarginate. Pectorals long, acute, reaching to or beyond vent,  $1\frac{1}{5}$  in head. Ventrals not nearly reaching vent, as long as snout and orbit. Anal spines strong, the second rather longer than third and a little stronger,  $3\frac{1}{5}$  in head.

Scales rather small, the series forming an angle at the lateral line, those below it running the more obliquely, those above lateral line forming nearly horizontal series, parallel with the lateral line. Scales on cheeks in about 7 rows, one row on subopercle and about 7 on opercle. Scales on breast very small, much smaller than those on opercles. Soft rays of vertical fins with accompanying series of scales.

Head  $2\frac{3}{4}$  times in length; depth 3. D. X, 14; A. III, 7; scales 5-47-11; tubes in lateral line 47.

Coloration in life: Above dark olivaceous, each scale with the basal half dark olive brown; sides with or without some silvery luster at bases of scales, forming when present faint longitudinal streaks; head and lower parts of body bright red, especially bright on lower parts of head, the color extending up on the sides for a varying distance; upper jaw and maxillary reddish; upper parts of head dark olivaceous; scales on sides of head without dark spots; a much interrupted light blue line



from middle of preorbital along suborbital, rarely extending behind the orbit, much less distinct than in *L. argentivittatus*, and disappearing in alcohol; cheeks sometimes with bluish spots or lines; inside of mouth red; vertical fins very dark, with more or less reddish: spinous dorsal with a broad median streak of very light slaty blue; pectorals and ventrals reddish, the latter with dusky.

This species is a very abundant food-fish at Mazatlan, being seen daily in the markets. It is preferred (probably on account of its bright colors) as a market fish to the other species of *Lutjanus*. It reaches a weight of about 15 pounds, and is known to the Mexican fishermen as "*Pargo Colorado*."

18. *Lutjanus prieto*, sp. nov. (28196, 28231, 28253, 28384, 29567, 29779, 29787.)

Body comparatively elongate, the back little elevated; profile very gently curved; snout long and pointed, one-third length of head; eye small, less than breadth of the wide preorbital; maxillary barely reaching to opposite front of orbit, its length  $2\frac{2}{3}$  in head; each jaw with a very narrow band of villiform teeth, outside of which is a single series of larger teeth; those in sides of upper jaw small; two in front, however, developed as large fang-like canines, larger than usual in this genus, their length about equal to the diameter of the pupil; a pair of smaller canines near the middle of the upper jaw, between the large ones; conical teeth of lower jaw distant, canine-like, 6 to 8 in number on each side, larger than in any of our other species of *Lutjanus*, much larger than those on sides of upper jaw; teeth on tongue in a large oval patch, in front of which are two smaller patches; teeth on vomer forming a crescent-shaped patch, without backward prolongation on the median line.

Gill-rakers few, not very large, distant, about 1+7. Preopercle with its posterior margin extending very obliquely forward, the angle therefore very obtusely rounded; a broad shallow notch above the angle, the margin above the notch convex, its edge minutely serrulate; a few coarser teeth at the angle; lower border mostly smooth. In the adult the whole margin of the preopercle is without serrations; suprascapular serrate. Posterior nostril nearly round; a single narrow band of scales extending downward and backward from occiput. Dorsal spines rather long, with sharp flexible tips, the fourth the longest, but shorter than the snout,  $3\frac{1}{2}$  in head; anal spines short and strong, much stronger than dorsal spines, the second and third of nearly equal length, the second somewhat strongest, not much longer than diameter of the orbit,  $4\frac{2}{3}$  in head. Soft rays of anal low,  $3\frac{1}{2}$  in head. Caudal fin emarginate,  $1\frac{2}{3}$  in head. Pectorals much longer than ventrals, extending slightly beyond them, their length  $1\frac{2}{3}$  in head.

Scales moderate firm, present on cheek, opercle, subopercle, and in a single series on interopercle. Scales above lateral line forming very



oblique series running upward and backward, not parallel with the lateral line. Scales on breast not very small, smaller than those on opercle. Basal portions of vertical fins scaly.

Head  $2\frac{2}{3}$  in length ( $3\frac{1}{5}$  with caudal); depth  $3\frac{2}{5}$  (4); eye  $5\frac{1}{4}$  in head. D. X, 13; A. III, 7; scales 6-45-11; lateral line with 50 tubes.

Coloration: Back and sides very dark olive brown, the back with a slaty tinge, the sides often with some faint purplish; sides paler below; the belly and lower parts of head white. Each scale on the dorsal region with the basal half dark. Head colored like the body; maxillary brownish, no bluish streak on preorbital. Vertical fins dark brownish; the spinous dorsal olive brown with a narrow dark streak at base and tip; anal with the margin of its first 3 rays white; pectorals olivaceous brown; ventrals dark brownish, becoming reddish at base. Inside of mouth reddish yellow. Young with the margin of spinous dorsal, and most of anal black.

This species is very abundant in the harbor of Mazatlan. It reaches a weight of 15 pounds, and as a food-fish ranks high, little below the "*Pargo Colorado*." It is known to the fishermen as "*Pargo prieto*."

The species of *Lutjanus* found at Mazatlan may be thus compared:

- a. Vomerine teeth forming an anchor-shaped patch, the band prolonged backward on the median line; body rather deep, the back somewhat elevated.
- b. Second anal spine shorter than third; soft fins rather high; teeth weak; snout moderate; scales above lateral line forming oblique series; a temporal as well as an occipital band of scales; dorsal spines slender; pectoral fin long; posterior nostril oblong. Color red; a large black blotch on lateral line below last dorsal spines; back and sides with rows of dark spots following the series of scales; fins reddish.

GUTTATUS.\*

- bb. Second anal spine longer than third; teeth strong, the upper canines very large; snout long and pointed, the preorbital broad; scales above lateral line forming series parallel with the lateral line; one narrow occipital band of scales; dorsal spines strong; pectoral fin long; posterior nostril slit-like. Color brownish, with faint silvery streaks along the rows of scales on sides; a light blue streak along preorbital and suborbital usually interrupted and often extending on the opercle; fins mostly pale..... ARGENTIVITTATUS.†
- aa. Vomerine teeth forming a crescent-shaped patch, without prolongation on the median line.

\* *Mesoprion guttatus* Steindachner, Ichthyol. Notiz. ix, 18, 1869, taf. viii. Mazatlan (Steind. ; Gilb.); Panama (Gilb.). This species has been erroneously confounded with the West Indian *L. synagris* (L.) J. & G. (= *Mesoprion uninotatus* C. & V.), a species not yet known from the Pacific.

† *Mesoprion argentivittatus* Peters, Berlin. Monatsber. 1869, 704. Mazatlan (Peters; Gilb.); Acapulco (Gilb.), Panama (Gilb.). This species has been confounded with the closely-related *L. caxis* (M. griseus C. & V.) of the Atlantic. The latter is best distinguished by the direction of the rows of scales above the lateral line, which are not throughout parallel with the latter.

- c. Scales above the lateral line forming oblique series; teeth very strong; lower jaw with about 8 canines, which are not much smaller than the canines of the upper jaw; posterior nostril nearly round; a narrow occipital band of scales; anal spines graduated; dorsal spines ten, rather slender; pectoral shortish, not nearly reaching anal; soft rays rather low; body rather elongate, the back not arched. Color dark brown; ventrals and anal largely blackish..PRIETO.
- cc. Scales above the lateral line forming horizontal series parallel with the lateral line; teeth rather strong; the large teeth of the lower jaw not canine-like, much smaller than the upper canines; posterior nostril oblong; occipital band of scales very narrow.
- d. Body rather deep, the depth about equal to length of head; scales rather small and firm, in five series above lateral line; second anal spine larger than third; dorsal spines ten, rather low and strong; soft rays of dorsal and anal high; pectorals long, about reaching anal. Color red, dusky above; a short blue streak on suborbitals; anal and ventrals largely dusky .....COLORADO.
- dd. Body elongate, the back not elevated, the depth less than length of head; scales large and rather thin, in four series above lateral line; dorsal spines eleven, high and slender; second anal spine smaller than third; soft dorsal and anal low; pectorals much longer than ventrals, but not reaching vent. Color brown, with broad silvery stripes along the rows of scales; young with silvery bars; lower fins dusky.....ARATUS.\*
- aaa. Vomerine teeth unknown; body elongate, the depth less than length of head; second anal spine longer than third; dorsal spines ten, low; pectorals very short, not longer than ventrals; scales rather small. Color purplish-brown, the centers of the scales paler; body with nine faint vertical bars; upper fins edged with dusky; base of pectoral dark .....NOVEMFASCIATUS.†

19. *Micropogon ectenes*, sp. nov. (28295, 29538, 28336, 28361.)

Head  $3\frac{1}{2}$  in length ( $3\frac{2}{3}$  with caudal); depth  $3\frac{1}{3}$  ( $4\frac{2}{3}$ ). Length (28295)  $16\frac{1}{2}$  inches. D. X-I, 25 or X-I. 24; A. II. 7 or II, 8; scales 7-53-13; tubes of lateral line 54.

Body rather elongate, slenderer than in *M. undulatus*, moderately compressed, the back little elevated; anterior profile straightish or slightly undulate. Head long, rather low, the snout long, and abruptly truncate at the tip, which projects but little beyond the premaxillaries. Mouth nearly horizontal, the lower jaw included, the maxillary barely reaching to opposite front of eye; its length  $3\frac{1}{8}$  in head. Teeth in rather broad bands, the anterior in upper jaw little enlarged.

Snout with the usual lobes and pores at tip, its length  $3\frac{1}{8}$  in head; chin with 5 large pores; about four small barbels on the inner edge of each dentary bone anteriorly. These are rather shorter than the posterior nostril, which is oblong and much longer than the anterior nostril.

Eye rather large, 6 in head,  $1\frac{1}{2}$  in interorbital width, a little more than half snout, a little less than preorbital width. Preopercle with numerous rather strong teeth above the angle which has two large,

\* *Mesoprion aratus* Günther, Proc. Zool. Soc. Lond. 1864, 145. Mazatlan (Gilb.); Punta Arenas (Gilb.); Chiapam (Gthr.); Panama (Gthr., Gilb.).

† *Lutjanus novemfasciatus* Gill, Proc. Ac. Nat. Sci. Phila. 1862: *Mesoprion inermis* Berlin. Monatsber. 1869, 705. Cape San Lucas (Gill); Mazatlan (Peters). Not obtained by Mr. Gilbert.

strongly-divergent teeth; the lower of these is directed obliquely downward. Gill-rakers short. Pseudobranchiae well developed.

Scales of moderate size, those on the breast little reduced. No scales on the dorsal or anal, except a basal series. Caudal largely scaly; about 20 scales in an oblique series from front of anal upward to spinous dorsal; 18 from vent upward to soft dorsal. Lateral line becoming straight well in advance of anal.

Spinous dorsal high, not higher than in *M. undulatus*, its third spine not very much shorter than the fourth. Third spine varying in length, about 2 in head ( $1\frac{3}{4}$  to  $2\frac{1}{3}$ ); all the spines freely flexible; longest soft ray  $3\frac{1}{4}$  in head. Caudal slightly double-concave, the upper, middle, and lower rays about equal,  $1\frac{3}{4}$  in head; lower rays shorter in young specimens; anal small, ending well in advance of posterior ray of dorsal; second anal spine rather small, its length  $3\frac{2}{5}$  in head; longest soft ray  $2\frac{1}{2}$  in head. Pectoral fin very long and pointed, reaching past ventrals, but not to vent, its length  $1\frac{1}{5}$  in head. Ventrals with the first ray filamentous;  $1\frac{1}{5}$  in head, without filament.

Color grayish silvery, without brassy tinge; dorsal region and sides above lower edge of pectorals marked with dark streaks extending obliquely upward and backward along the series of scales. Besides these, about ten short oblique dark bars extending downward and forward, crossing the arched portion of the lateral line, the longest of these about as long as snout; lining of gill-cavity blackish; peritoneum pale; fins all yellowish, the tip of spinous dorsal blackish; upper edge of pectoral and border of soft dorsal dusky; region above and below base of pectoral with dark punctulations.

This species is rather common at Mazatlan, where it is known as "*Corbina*." It was not noticed at Panama, where its place is taken by the closely related *Micropogon altipinnis*. It is closely allied to *Micropogon undulatus* (L.) C. & V., of the Atlantic coast, differing in its more elongate body, rather larger scales, &c. The color and number of fin rays are also somewhat different in the two species. From *M. altipinnis*, to which it is still more closely allied, it differs chiefly in the smaller scales and greater number of dorsal rays.

20. *Sciæna icistia*, sp. nov. (28182, 28228, 28275, 28368, 29566, 29613, 29615, 29775, 29790.)

Subgenus *Bairdiella* Gill.

Body elongate, compressed, the back a little elevated; snout very short, compressed, and rather blunt, 4 in head; mouth moderately wide, oblique; lower jaw somewhat included; maxillary reaching vertical from posterior margin of pupil,  $2\frac{3}{4}$  in head; upper jaw with a narrow band of villiform teeth and an external series of somewhat larger teeth; lower jaw with a single series of teeth smaller than the enlarged teeth of upper jaw and more close-set; in front this series broadens into a narrow band.

Chin with 4 pores: premaxillaries on the level of lower part of pupil projecting beyond snout. Interorbital region slightly depressed. Gill-rakers long and strong, about 6-17 in number. Preopercle with its lower edge smooth, the posterior edge armed with distinct spines, the three spines nearest the angle much the longest, the lowest directed vertically downward and somewhat forward. Eye large, its diameter slightly less than length of snout and than interorbital width,  $4\frac{2}{3}$  in length of head. Scales rather small: series of small scales on membrane of dorsal and anal; lateral line little arched, becoming straight opposite interval between vent and anal.

Spinous dorsal high, the spines all very slender, weak, and flexible, more slender than in other species of this subgenus; the third and fourth about equal, much longer than the others, the upper margin of the fin very oblique; the longest spine about seven-tenths length of head, much longer than the soft rays, which are about  $3\frac{1}{3}$  in head.

Second anal spine exceedingly strong,  $1\frac{3}{4}$  in head, about four-fifths length of fourth dorsal spine, and about as long as first soft ray of anal; middle rays of caudal slightly produced,  $1\frac{1}{2}$  in head, the fin subtruncate. Ventrals long, their length more than half the distance from their base to origin of anal. Pectorals not reaching vertical from tips of ventrals, about equal to them in length,  $1\frac{1}{2}$  in head.

Head  $3\frac{2}{5}$  in length (4 with caudal); depth  $3\frac{2}{5}$  ( $4\frac{1}{5}$ ). D. X-I, 25; A. II, 8; scales 9-62-15; Lat. 1. with 52 tubes.

Color grayish silvery above, silvery on sides and below; dorsal region with faint streaks produced by darker centers of the scales. Spinous dorsal blackish, darker on membrane of first spine, the soft portion as well as the caudal yellowish-dusky. Ventrals and pectorals pale, each with a faint yellowish blotch; axil of pectoral black above; anal pale.

This species differs from *Sciæna armata* (*Bairdiella armata* Gill = *Corrina acutirostris* Steindachner) in the much longer and more slender dorsal spines, as well as in various details of form. The teeth of the lower jaw are also quite different.

*S. icistia* is very common at Mazatlan, where it is known as "*Corbineta*". It reaches an average length of 6 inches, and is little valued as a food-fish. Many specimens were obtained.

21. *Scarus perrico*, sp. nov. (28328 U. S. Nat. Mus.)

Subgenus *Hemistoma*\* Sw.; allied to *S. chlorodon* Jenyns.

Body robust, deep, compressed: top of head with a very large adipose hump. Teeth green; no pointed teeth at angle of mouth; upper lip covering about half the surface of the upper dentary plate; lower lip covering base only of lower dentary plate. Cheeks with two rows of scales, the lower of four, the upper of five: lower limb of preopercle wholly naked. Caudal fin somewhat rounded, its lobes not produced. Pectoral fin three-fourths length of head: ventrals inserted under front of pectorals.

\* *Hemistoma* Swainson, 1839 = *Pseudoscarus* Bleeker, 1861.



Coloration in life: light brownish, with some greenish shading on sides and bluish-green on caudal peduncle; fins all bright blue; snout and forehead bluish; orbits surrounded by radiating dots and dashes of green. In spirits: a yellowish area below and in front of eye; upper edge of dorsal and lower edges of caudal, anal, and ventrals yellowish, as is the lower side of the head.

Head, 3 in length; depth,  $2\frac{1}{2}$ . D. IX, 10; A. II, 9; Lat. l. 24.

This species is very common in the rocks about Mazatlan, where it is called *Lora* or *Peñrico*, both words meaning parrot. It is seldom caught and is not eaten. One specimen, 23 inches in length, was procured, and is the type of the species.

22. *Pomacanthus crescentalis*, sp. nov. (28139.)

Subgenus *Pomacanthodes* Gill; allied to *Pomacanthus zonipectus* (Gill) Gthr.

Body broadly ovate, with short and slender caudal peduncle. Head deeper than long, the profile very steep and uneven; a bulge above the occiput, another above the eye, and another at the premaxillaries, the interspaces between these concave. Eye broader than preorbital,  $3\frac{1}{2}$  in head (in the largest specimen), its diameter half the width of the cheeks below it. Eyes proportionally larger in smaller specimens. Vertical limb of preopercle minutely serrate, the spine at the angle about as long as pupil. Mouth small, with broad bands of setiform teeth as in other species. Length of mandible half greater than diameter of eye. Gill-rakers very short; gill-membranes narrowly joined to the isthmus.

Dorsal spines rapidly graduated, the last (eleventh) spine two-thirds to three-fourths length of head, three-fifths the height of the soft rays of dorsal. Anal spines long, stronger than those of dorsal, rapidly graduated. Soft rays of anal lower than those of dorsal, the outline of the fin rounded. Soft dorsal highest towards the front, the rays more rapidly shortened posteriorly than those of anal. Caudal peduncle deeper than long, the fin somewhat rounded. Pectoral fins short, reaching scarcely past vent, a little shorter than head. Ventrals elongate, the first ray filamentous; the fin one-third longer than head, reaching third anal spine.

Head everywhere scaly, the scales of head, breast, and front of back, very small; anteriorly reduced to shagreen-like roughness, as in *Pomacanthus arcuatus*. Scales of body irregular in size, very rough; large and small ones closely intermixed.

Head  $3\frac{1}{2}$  in length; depth  $1\frac{1}{2}$ . D. XI-23; A. III, 22; Lat. l. ca. 70.

Color brownish-black, becoming pure black on dorsal and anal fins; top of head with a median line of bright yellow which divides on the snout, a branch passing down on each side of mouth, the two meeting, or nearly meeting, on the throat; a small white spot on chin; sides with five very distinct narrow bright yellow cross-bars, strongly convex for-



wards; the first from front of dorsal, touching posterior margin of orbit, extending along preopercle to base of spine, then turning abruptly backwards, the two meeting on belly immediately in front of ventral fins; the second from immediately in front of anal base, in a strong curve behind base of pectorals, reaching dorsal at base of seventh and eighth spines, thence narrowed and continued backwards on the fin; the third extends from eighth and ninth soft rays of dorsal to the fourth and fifth of the anal, the fourth from end of dorsal base to end of anal base, the two latter bands much curved and continued backwards on dorsal and anal fins, the attenuated ends sometimes blue; the fifth bar crosses the caudal near its base, and runs back on fin above and below. Between these yellow bars and parallel with them are numerous narrow blue lines. Dorsal blue-edged anteriorly, this color a backward continuation of the first bands. Caudal translucent with a vertical series of short linear black blotches.

This species is said by the fishermen to be common among the rocks in Mazatlan Harbor, and is called by them *Muñeca*. But two specimens were seen by the collector. Several others were afterwards obtained at Panama, where it is very common.

23. *Gobiesox zebra*, sp. nov. (29250.)

Body comparatively very long and narrow, the greatest width about one-fifth the total length. Head narrow, depressed, its width about  $4\frac{1}{2}$  times in length of body. Eye small, its diameter about half interorbital width. Opercular spine well developed. Ventral disk nearly as long as head. Mouth rather small, anterior, maxillary reaching front of eye. Incisors of lower jaw nearly horizontal, rather broad, three-lobed at tip, the middle cusp the longer. Upper teeth much smaller, the median ones compressed, blunt, close-set, a little shorter than the lateral teeth and with dentate edges; one or two series of small teeth close behind them. Anal beginning under middle of dorsal; the distance from insertion of dorsal to base of caudal is contained  $3\frac{2}{3}$  in length; pectoral half as long as head; caudal truncate with rounded angles.

Head  $3\frac{2}{3}$  in length; depth nearly 8. D. 7; A. 6.

Back with five dark cross-bars about as wide as the interspaces, three of them in front of the dorsal fin, the two anterior much broader and more distinct than the others; these bars are all distinct on the back, fading on the sides, which are often vaguely clouded with dark; the color of these dark bars varies from reddish-brown to black, and that of the interspaces from olivaceous to light pink and bright rose-red; top of head bright red, marbled with light slaty-bluish; a black blotch on opercle, and two very distinct black cross spots, one on each side of median line, forming the front of first dorsal bar; sometimes cheeks with 2 or 3 pale bluish streaks; dorsal, pectoral, and caudal more or less shaded with dusky; lower fins pale; usually a dark bar at base of caudal and one across middle of the fin.

Very abundant in the rocky tide-pools around Mazatlan, hiding under the numerous sea-urchins. About 30 specimens were collected, the largest nearly 3 inches long.

24. *Gobiesox eos*, sp. nov. (29247.)

Body comparatively short, stout, and narrow, the head rather broad, but, as well as the body, much less depressed than in *G. erythrops*; the width of the head less than its length, contained  $3\frac{2}{3}$  times in body; incisors serrate or tricuspid, the teeth as in *G. zebra*. Eye moderate, about  $1\frac{1}{2}$  in interorbital space, which is about  $3\frac{1}{2}$  in head. Pectoral about one-half length of head. Ventral disk shorter than head. Distance from base of caudal to front of dorsal  $3\frac{1}{5}$  in total length. Caudal truncate. Head 3 in length; depth  $5\frac{1}{2}$ . D. 6; A. 6. Bright rosy red, sometimes made dusky above with black points; back with from one to three faint dark bars; three dark lines downwards and backwards from orbit, and usually one or two more on the opercle; caudal usually with a reddish bar at base and a dusky one towards tip; fins otherwise nearly plain.

Very abundant in the rock-pools, where it is nearly always found, in company with *G. zebra*, hiding under the sea-urchins. The largest examples seen are about  $1\frac{1}{2}$  inches long.

25. *Gobiesox erythrops*, sp. nov. (29248.)

Head scarcely longer than broad, proportionately very broad and depressed, its breadth three times in total. Incisors in both jaws entire and rather broad, the lateral teeth, as usual, pointed; no canines. Eyes very large, considerably wider than the narrow interorbital area,  $3\frac{1}{3}$  in head; interorbital area nearly 5 in head. Ventral disk a little longer than head,  $2\frac{2}{3}$  in body. Pectoral about one-third length of head. Distance from front of dorsal to caudal,  $3\frac{2}{5}$  in body. Caudal truncate with rounded edges.

Head  $2\frac{1}{2}$ ; depth 6. D. 6; A. 5.

Light olivaceous; body with three or four bars of cherry red; head marbled with red; eyes intensely cherry red, their upper border blackish; fins pale, the upper mottled with reddish; caudal barred with red.

But two specimens,  $1\frac{1}{2}$  inches long, taken in a rock-pool; evidently rare. A specimen of this species from the Tres Marias Islands, is in the collection at Woodward's Gardens, San Francisco.

26. *Gobiesox adustus*, sp. nov. (29249.)

Head and body broad and flat, much depressed; width of head nearly equal to its length,  $3\frac{2}{3}$  in body. Incisors in middle of lower jaw broad, entire; those in upper jaw narrow, blunt, little compressed, entire, shorter than the lateral teeth; behind these two or three series of smaller teeth. Eyes rather large, separated by a broad interorbital space, which is one-third the length of the head and about half greater than diameter of eye. Opercular spine sharp. Pectoral short, about half

length of head; ventral disk as long as head; distance from base of caudal to front of dorsal equaling three-tenths of the length; caudal rounded behind.

Head 3 in length; depth  $5\frac{1}{2}$ . D. 9; A. 7.

Brown, banded with blackish on body, the head marbled with darker brown; front of dorsal black, the fins dusky with dark points.

Three specimens, the largest about 2 inches long, were obtained in a tide-pool at Mazatlan. The species is evidently not common.

27. *Gobiosoma zosterurum*, sp. nov. (29245.)

Body long, slender, its greatest depth less than greatest depth of head. Head long, slender; mouth large, the lower jaw projecting; maxillary extending slightly beyond posterior edge of orbit. Eye rather large, longer than snout,  $3\frac{2}{3}$  in head; the interorbital space narrower than the pupil. Teeth small, in villiform bands, the outer in the upper jaw slightly enlarged. Snout rather pointed, subconical, the profile not very gibbous. Spinous dorsal high, the spines slender, the anterior filamentous, its height considerably more than greatest depth of body. Ventrals  $1\frac{2}{3}$  in length of head; pectorals short, half length of head. Caudal  $\frac{2}{3}$  length of head, skin wholly naked.

Head  $3\frac{1}{3}$  in length; depth  $6\frac{2}{3}$ ; D. IV-10; A. 12. Olivaceous, vaguely barred, everywhere closely punctate with darker, even the belly not pale; lower parts of head thickly punctate with dark dots like the sides; sides of body and head with some faint pale spots; caudal with two distinct black lengthwise bands, its upper and lower edges white, the middle part colored like the body; dorsal and anal largely black, with pale edgings; pectorals and ventrals dusky.

A single specimen about  $1\frac{1}{2}$  inches long was taken with a seine in the Astillero at Mazatlan.

28. *Clinus zonifer*, sp. nov. (28122.)

Subgenus *Labrosomus* Swainson; allied to *Clinus delalandi* C. & V.

Form rather stout, compressed; snout not very short, rather pointed, the profile gibbous above the eyes, thence declining straight to the tip of the snout; mouth rather small, the maxillary reaching front of eye; eye large,  $3\frac{1}{2}$  in head, as long as snout; small slender cirri above the eyes, and a fringe of rather long filaments at the nape rather longer than the orbital cirri. Outline of spinous dorsal emarginate; first spine a little longer than eye, the second, third, and fourth progressively shortened, the fifth again longer; the eighth to eleventh spines are the longest, thence gradually decreasing to the next to the last, which is much shorter than the last; soft dorsal rays considerably higher than the spines, the longest about one-half length of head. Anal long, not very high, the membrane deeply notched between all but the last six rays, which are the highest. Pectorals five-sixths length of head;

ventrals as long as from snout to edge of preopercle. Belly naked anteriorly; the scales small, cycloid; lateral line complete.

Head  $3\frac{1}{2}$  in length; depth  $4\frac{1}{5}$ . D. XIX, 9; A. II, 19; Lat. 1. 53.

Color olivaceous, darker above, much mottled and speckled with clear dark brown; sides with five distinct irregular dark brown bars, extending from base of dorsal to level of lower margin of pectoral, their lower edges connected by a vague undulating longitudinal band; a blackish blotch on occipital region, and black blotches on cheeks, opercles, and before base of pectoral; opercle with several narrow pinkish streaks; head below with narrow streaks formed by series of dark brown spots; an interrupted brown bar across lower jaw; belly unspotted; ventrals pale; other fins all barred with narrow series of dark brown dots; anal somewhat dusky.

*Clinus zoniifer* is the most abundant denizen of the rock-pools around Mazatlan, with the single exception of *Gobius soporator*, and reaches a length of about three inches. This is the species mentioned by Mr. Lockington (Proc. Acad. Nat. Sci. Philad. 1881, 114) as *Clinus phillipi* Steind., from the Gulf of California.

29. *Tripterygium carminale*, sp. nov. (28118.)

Body rather slender, heavy forwards, rapidly tapering behind. Head short, the snout low and rather pointed, the profile straight and steep from the snout to opposite the front of the eyes, there forming an angle and extending backwards nearly in a straight line. Eyes very large, longer than snout, 3 in head, high up and close together. Mouth wide, the jaws subequal, the maxillary extending backwards to front of pupil. Teeth moderate, essentially as in species of *Clinus*, those of the outer series enlarged. No evident cirri on the head. Scales on body of moderate size, ctenoid, the edges strongly pectinate; belly naked; lateral line extending to opposite last ray of soft dorsal, ascending anteriorly but without convex curve. Dorsals three, the first and second contiguous, the second and third well separated; first dorsal of three spines, the first of which is the highest and about as long as diameter of eye; the second dorsal of higher and slenderer spines, the anterior the highest, the longest about equaling greatest depth of body; soft dorsal shorter and a little lower than second spinous dorsal. Caudal small. Anal long, beginning nearly under middle of spinous dorsal. Pectoral long, longer than head, reaching much past front of anal. Ventral three-fourths length of head.

Head  $3\frac{2}{3}$  in length; depth about  $5\frac{1}{2}$ . D. III-XII, 9; A. II, 17; Lat. 1. 40.

Color light brownish, with four dark brown cross-bars on sides, about as wide as the interspaces, which are marked with more or less reddish and with some lighter spots; belly pale; space behind pectoral dark; a dark bar downward and one forward from eye. First dorsal mottled with darker, second and third dorsals nearly plain; a narrow dark bar



at base of caudal, and a broader one towards tip, the fin sometimes entirely black, pectorals somewhat barred; lower fins plain.

This species is represented in our collection by four specimens, each about  $1\frac{1}{2}$  inches long, taken from a deep tide-pool at Mazatlan.

30. *Salarias chiostictus*, sp. nov. (28117.)

Body moderately elongate, compressed. the head short, blunt, almost globular, about as broad as deep, and a little longer than broad. Mouth inferior, without lateral cleft. the lower jaw included; width of cleft of mouth two-thirds length of head. Teeth small, weak, finely pectinate; canine teeth small, not so long as diameter of pupil. Supraorbital cirrus divided in four, its height three-fourths that of the eye. Eye  $3\frac{1}{3}$  in head. Interorbital space channelled, narrower than eye. Maxillary extending to behind middle of eye. No crest on top of head. First dorsal low and even, its spines rather slender, the last spines short, scarcely connected by membrane with the soft rays; soft dorsal well separated from caudal. Caudal subtruncate, with rounded angles. Anal lower than soft dorsal, with a little longer base. Pectorals a little longer than head; ventrals about half as long.

Head  $4\frac{1}{5}$  in length; depth  $5\frac{1}{4}$ ; D. XII-15; A. 15.

Color in life: Olive brown above, lighter below: five broad dark bars from dorsal fin to middle of sides, each terminating above on the fin, and below on sides in a pair of black spots; sometimes only the spots are distinguishable, the bars being obscure; sides below spinous dorsal with numerous black specks, and with numerous oblong spots of bright silvery; sometimes a silvery streak from upper portion of base of pectorals to base of caudal; a broad salmon-colored streak on each side of ventral line; sometimes the space between the silvery lateral band and the base of the anal is darker, the vertical bars again appearing as pairs of black, vertical blotches. Head yellowish olive, darker above and reticulated with narrow brown lines, these appearing as parallel bars on the upper lip and radiating from the median line on the under side of the head. Vertical fins light grayish, with black spots, which appear as wavy bars on the caudal fin. Pectorals and ventrals pale, the former with a yellowish shade at base. Orbital tentacles bright red.

This species is known from four specimens (the largest  $2\frac{1}{4}$  inches in length), taken in a deep rock pool at Mazatlan.

31. *Fierasfer arenicola*, sp. nov. (29244.)

Body with nape slightly elevated, thence tapering regularly to the tail. Snout blunt, rounded, protruding; the mouth subinferior, nearly horizontal, large, the lower jaw included; gape wide, the maxillary one-half length of head, extending beyond the vertical from orbit; teeth in upper jaw very small, acute, in a narrow band, none of them enlarged; those in lower jaw and on vomer blunt, conic, in a wide band; those in outer series acute; a few on each side of mandible, and two or three anteriorly on vomer enlarged, canine-like.



Gill-openings very wide, the branchiostegal membranes little united, leaving nearly all of isthmus uncovered: the membranes united as far back only as vertical from end of maxillary. Opercle adherent above the upper angle, which is produced in a point extending above the base of pectorals. Below the angle the opercular margin runs very obliquely forwards. Eye large, equaling length of snout, greater than interorbital width.

Origin of dorsal fin distant from nape by the length of the head; the fin a very inconspicuous fold anteriorly, becoming higher posteriorly, where the rays are evident. Anal well developed along entire length, beginning immediately behind vent and running to tail; its rays visible. Caudal exceedingly short. Pectorals very well developed, more than half length of head. Vent just in front of base of pectorals.

Head  $6\frac{1}{2}$  in length; depth  $10\frac{1}{2}$ ; eye 5 in head.

Head and body perfectly translucent; a faint silvery luster on middle of sides anteriorly; a few inconspicuous small light yellowish spots along middle of sides (disappearing in alcohol); tip of tail dusky; upper margin of orbit black.

A single specimen,  $3\frac{1}{4}$  inches long, was found buried in the sand at low-tide on the beach of Mazatlan.

32. **Etropus crossotus**, gen. and sp. nov. (*Pleuronectidae*.) (25124.)

CHAR. GEN.—Eyes and color on the left side. Body deep, regularly oval. Head small; mouth very small, the teeth close set, pointed, in a single series, mostly on the blind side. Eyes narrow, separated by a narrow scaleless ridge. Margin of preopercle free. Ventrals free from the anal, that of colored side on ridge of abdomen. Dorsal beginning above eye; caudal fin double truncate; anal fin not preceded by a spine; scales thin, ctenoid on left side, smooth on blind side: lateral line simple, nearly straight. (*ετρον*, abdomen; *πους*, foot; the ventral being on the ridge of the abdomen.)

CHAR. SPEC.—Body oval, strongly compressed, with the dorsal and ventral curves nearly equal: both outlines strongly arched anteriorly. Head very small; snout short; mouth very small, its cleft not so long as the diameter of the orbit. Teeth conical, pointed, close-set, strongly incurved, in a single series. Those in the upper jaw on the blind side only; those in the lower jaw, on both sides. Eyes large, the lower in advance of the upper, the two separated by a very narrow scaleless ridge, which extends backward above the preopercle. Edge of opercle on the blind side, with a row of conspicuous white ciliae. Upper nostril turned somewhat to blind side: anterior nostril of left side, with a very slender cirrus.

Dorsal fin commencing over front of upper eye, its middle rays highest, the anterior not elevated. Anal fin not preceded by a spine, its middle rays highest. Caudal fin very sharply double-truncate; as long as head. Pectorals short, that of left side the longer, about three-

fourths length of head. Ventral of colored side on the ridge of the abdomen: the membrane of its last ray nearly reaching base of first ray of anal. Ventral of blind side longer than the other, half the length of the head, inserted farther forward than the ventral of colored side. Vent lateral, with a well-developed anal papilla.

Scales thin, large; ctenoid on colored side, smooth on blind side, those on the middle part of the body larger. Head entirely scaly, except snout and interorbital ridge. Rays of vertical fins, with scales on the basal half, on colored side. Lateral line developed equally on both sides, nearly straight.

Head  $4\frac{1}{5}$  in length; depth  $1\frac{2}{10}$ . D. 80; A. 61; V. 6; Lat. l. about 48.

Color light olive brown, with some darker blotches. Vertical fins finely mottled and streaked with black and gray. Pectoral and ventral of left side spotted.

A single specimen, about 5 inches long, was taken with a seine in the Astillero at Mazatlan. Numerous others were afterwards obtained at Panama.

33. *Malthe elater*, sp. nov. (28127.)

Body very broad and depressed, the disk considerably broader than long, its width  $1\frac{2}{3}$  times in length of body: back and snout considerably raised above rest of body; greatest depth of body scarcely more than width of mouth. Mouth small, its width half greater than diameter of orbit. Snout very short, scarcely projecting beyond mouth, its length about equal to the interorbital width, shorter than its own width in front. Eye rather large, much longer than snout, wider than the interorbital area. Process representing first dorsal spine present, small. Skin covered with spines which are comparatively slender and sharp, their stellate bases inconspicuous; the spines on snout and middle of back and tail largest, much slenderer and sharper than in *M. notata*. No spines on ocellæ of back. Belly rough. Under side of tail with tubercular plates. Tail depressed towards base of fin. Soft dorsal and anal so shrunk that the rays cannot be counted. Pectorals one-third longer than ventrals, their length  $1\frac{2}{3}$  width of mouth. Caudal a little longer than pectoral,  $4\frac{1}{3}$  in body. Length 4 inches.

Color light olive, above everywhere thickly and uniformly covered with small round spots of dark brown, these about as large as the pupil, and about as wide as the lighter interspaces. A conspicuous ocellus, larger than eye, on each side of back. This ocellus has a bright yellow central spot surround by a black ring, around which is a pale ring, and finally a fainter dark one. Under parts plain white. Pectorals spotted; caudal yellowish at base with a terminal blackish band.

A single specimen was collected in Mazatlan Harbor and presented to the National Museum by Dr. J. U. Bastow. Two other specimens were afterwards seen but not obtained. The species is evidently rare at Mazatlan, and is unknown to the fishermen.

## DESCRIPTION OF A NEW OWL FROM PORTO RICO.

By ROBERT RIDGWAY.

ASIO PORTORICENSIS, sp. nov.

SP. CH.—Above dusky brown, nearly or quite uniform on the dorsal region; the scapulars, however, narrowly bordered with pale ochraceous or dull buff; feathers of the head narrowly, and those of the nape broadly, edged with buffy; rump and upper tail-coverts paler brown or fawn-color, the feathers marked near their tips by a crescentic bar of dark brown. Tail deep ochraceous, crossed by about five distinct bands of dark brown, these very narrow on the lateral rectrices, but growing gradually broader toward the intermediæ, which are dark brown, with five or six pairs of ochraceous spots (corresponding in position to the ochraceous interspaces on the other tail feathers), these spots sometimes having a central small brown blotch. Wings with dark brown prevailing, but this much broken by a general and conspicuous spotting of ochraceous; primaries crossed with bands of dark brown and deep ochraceous, the latter broadest on the outer quills, the *pictura* of which is much as in *A. accipitrinus*, but with the lighter color usually less extended. Face with dull, rather pale, ochraceous prevailing; this becoming nearly white exteriorly, where bordered, around the side of the head, by a uniform dark brown post-auricular bar; eyes entirely surrounded by uniform dusky, this broadest beneath and behind the eye. Lower parts pale ochraceous or buff, the crissum, anal region, tarsi, and tibiæ entirely immaculate; jugulum and breast marked with broad stripes of dull brown, the abdomen, sides, and flanks with narrow stripes or streaks of the same. Lining of the wing nearly immaculate ochraceous. Bill dusky; iris yellow. Wing, 11.25–12.00; tail, 5.25–5.50; culmen, .70; tarsus, 1.85–2.00; middle toe, 1.20–1.30.

*Hab.*—Porto Rico.

In "History of North American Birds," Vol. III, p. 25, under the head of "*Otus brachyotus*," reference was made to this form of the Short-eared Owl, as follows: "A specimen from Porto Rico (No. 39643) is somewhat remarkable on account of the prevalence of the dusky of the upper parts, the unusually few and narrow stripes of the lower parts, the roundish ochraceous spots on the wings, and in having the primaries barred to the base. Should all other specimens from the same region agree in these characters, they might form a diagnosable race. The plumage has an abnormal appearance, however, and I much doubt whether others like it will ever be taken." That the latter unfortunate prediction was quite unnecessary is fully demonstrated by three additional specimens kindly sent me for examination by Mr. George N. Lawrence, all of which closely resemble the one in the National

Museum collection. In fact, the characters of the four examples are so uniform as to leave no doubt that the Porto Rican Short-eared Owl is a well marked local form, which, on account of its isolation and consequent improbability of its intergradation with *A. accipitrinus*, I propose to recognize as a distinct species.

In connection with this subject I have carefully examined a very large series of *A. accipitrinus*, and have been entirely unable to distinguish between *continental* specimens from any part of the world. Examples from Chili, the Argentine Republic, Brazil, and Costa Rica can be perfectly matched by others from North America and Asia; an example from Costa Rica is almost exactly like one from Beyrout, Syria; another from the Sandwich Islands is undistinguishable from certain American specimens, while there appears to be no constant difference between North American specimens and those from Europe and Asia. As a rule, European skins are paler than North American ones; but the palest (as well as the most deeply colored) examples I have seen are from North America. In short, I find that in a series from any given locality, on either continent, the individual variation is greater than any geographical variation in this species.

Although I have not seen the Short-eared Owl of the Galapagos (*Otus galapagoensis* Gould), I have no doubt of the validity of that species. The transverse bars on the feathers of the lower parts and the longitudinal streaks on the legs, are features never observable in *A. accipitrinus* nor in *A. portoricensis*. In other respects, however, *A. galapagoensis* appears to be quite similar to the latter, but is still darker colored, as well as smaller.

It appears, therefore, that, besides the common and nearly cosmopolitan *A. accipitrinus*, there are two\* well-marked insular forms belonging to the subgenus *Brachyotus*, which, though in all probability descended from the same ancestral stock, should, on account of their geographical isolation, be considered as distinct species. Compared with *A. accipitrinus*, they differ from that species, and from each other, as follows:

a. Legs entirely immaculate; lower parts without trace of transverse bars; first primary much shorter than second.

1. *A. ACCIPITRINUS*. Dorsal region conspicuously striped with ochraceous; outer webs of primaries with ochraceous largely prevailing toward the base. Wing usually more than 12.00 inches. *Hab.*—Europe, Asia, the whole of continental America, and Sandwich Islands. (Strong's Island, West Indies?)

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\*A single specimen of a Short-eared Owl from Strong's Island, West Indies (No. 66235, U. S. Nat. Mus.), appears at first glance to be quite peculiar in coloration, by reason of the general prevalence of ochraceous above, the nearly uniform reddish ochraceous of the rump and upper tail-coverts, and more nearly uniform brownish of the wing-coverts, especially the smaller ones. There are also other slight differences, appreciable to the eye but difficult to define, and it may be that the specimen in question merely represents one of the many individual variations of the common species. I therefore, for the present at least, refer it to *A. accipitrinus*, since it would be unsafe to predicate a local race upon a single specimen. The measurements are as follows: Wing, 11.50; tail, 5.75; culmen, .80; tarsus, 1.80; middle toe, 1.15.



2. *A. PORTORICENSIS*. Dorsal region nearly uniform dark brown; outer webs of primaries with the ochraceous spaces scarcely or not at all more extensive than the brown ones on the basal portion of the quills. Wing, 11.25–12.00. *Hab.*—Porto Rico.

b. Legs marked with narrow dusky streaks; lower parts with a greater or less number of transverse bars; first primary scarcely shorter than the second.

3. *A. GALAPAGOENSIS*. Dorsal region irregularly barred or transversely spotted with fulvous; outer webs of primaries with the brown spaces more extensive than the fulvous ones, on the basal portion of the quills. Wing, 11.00. *Hab.*—Galapagos Islands.

I am aware that my conclusions, as given above, are somewhat different from those of Mr. R. B. Sharpe in vol. ii as expressed in his "*Catalogue of the Striges*" in the British Museum (pp. 238, 239). Mr. Sharpe there arranges the specimens of *A. accipitrinus* in the British Museum collection under four headings, as follows: "*a. Asio accipitrinus*," "*β. Asio cassini*," "*γ. Asio galapagoensis*," and "*δ. Asio sandwichensis*"; this arrangement being based upon the examination of 39 specimens of the first, 24 of "*β*", 3 of "*γ*", and 2 specimens of the last named. He admits, however, the impossibility of always distinguishing between American and European specimens, though he states that "in America the general run of the specimens is rather darker and more ochraceous," both of which statements entirely agree with my own observations. The Falkland Island birds, says Mr. Sharpe, "seem permanently rufescent, but cannot be distinguished from some Chilian skins; and as some of the latter agree perfectly with European examples, no line for specific separation can be drawn." As for myself, never having seen specimens from the Falkland Islands, I am unable to comment thereon.

The Galapagos Short-eared Owl is referred by Mr. Sharpe to *A. accipitrinus* solely, it appears, on account of the close resemblance between a Bogota skin and specimens from those islands in general darkness of coloration; but since the former is especially stated to lack the leg-streaks, which constitute perhaps the most important character of coloration in *A. galapagoensis*, it would seem that such a view of the case is hardly warranted. That this disposition of *A. galapagoensis* was, however, made very doubtfully by Mr. Sharpe is evident from his remarks in connection with the subject, as follows: "The Owl from the Galapagos is by far the most different of any, by reason of its small size, dark coloration, golden forehead, and striped thigh-feathers. I have never seen a specimen from any other locality exhibiting the latter character; at the same time a Bogota skin in every other respect approaches it in appearance, and therefore, although I admit that at present it would appear to be specifically distinct, I should like to be sure that the New Granadan Short-eared Owl would not form a connecting link."

"The specimens from the Sandwich Islands," says Mr. Sharpe, "form



an interesting pair on account of their locality, but they cannot be separated as a species. They are rather small, and have a very dusky frontal patch; this I have found in other Asiatic specimens, and therefore the Sandwich Island Owl can only be considered a small race of *A. accipitrinus*."

The United States National Museum possesses a single specimen (No. 13890, T. R. Peale) of the Short-eared Owl from the Sandwich Islands, and this one can be exactly matched, both in coloration and dimensions, by American specimens, while many of the latter are smaller than the two Honolulu examples the measurements of which are given by Mr. Sharpe. Thus it seems that the Sandwich Island bird can be in no way separated from the common and widely distributed *A. accipitrinus*.

As to the difference in coloration said by Mr. Sharpe to distinguish the sexes in this species, I cannot substantiate it with regard to the specimens in the United States National Museum, if the determinations of collectors are to be relied upon. Two specimens from China, represent nearly the extremes of coloration, yet the lighter colored one is the female, the darker one the male (according to the labels); one of the lightest colored of North American specimens is marked as a female, while many dark colored specimens are determined as males. Neither can I agree with Mr. Sharpe in his opinion that the dark bar or spot sometimes found on the basal portion of the inner web of the outer primary is a "tolerably good indication of an adult bird," but from an examination of many specimens am inclined to regard it as merely an individual peculiarity, having no reference to either age or sex. As to the very marked variation in the depth of the ochraceous coloring (some specimens being deeply tawny and others nearly white beneath), it appears to me that the two extremes, instead of being sexual, are merely analogous to the normal and erythrismal phases of other Owls, there being every gradation in different specimens between the two extremes of coloration.

Below are given the principal synonyms and references pertaining to *A. accipitrinus* and its allies.

## 1. ASIO ACCIPITRINUS (Pall.) Newton.

(*Short-eared Owl*.)

*Noctua major* BRISS. Orn. i, 1760, 511 (excl. syn. pt.). (*Le Grande Chouette*.)

*Strix accipitriua* PALL. Reise Russ. Reichs. i. 1771-76, 455.

*Asio accipitrinus* NEWT. ed Yarrell's Brit. B. i, 1872, 163.—SHARPE, Cat. Striges Brit. Mus. 1875, 234 (excl. syn. *galapagoensis* Gould.)—RIDGW. Nom. N. Am. B. 1881, 36, No. 396.

*Brachyotus accipitrinus* GURNEY Ibis, 1872, 328 (Formosa).

*Noctua minor* S. G. GMEL. N. Comm. Petrop. xv. 1771, 447, pl. 12.

*Strix arctica* SPARRM. Mus. Carls. 1786-89, pl. 51.—DAUD. Tr. Orn. ii, 1800, 197.

*Strix brachyotus* J. R. FORST. Phil. Trans. lxii, 1772, 384 (Severn R., Arctic, Am.!).—GMEL. S. N. i, pt. 1, 1788, 289.—WILS. Am. Orn. iv, 1812, 64, pl. 33, fig. 3.—NAUM. Vög. Deutschl. i, 1820, 459, pl. 45, fig. 1 ("brachyotos").—NUTT.

- Mau. i, 1832, 132.—AUD. Orn. Biog. v, 1839, 273, pl. 432.—SW. & RICH F. B. A. ii, 1831, 75 ("brachyota").
- Strix brachiotus* MEYER & WOLF Taschenb. Vög. Deutschl. i, 1810, 43.
- Otus brachyotus* BOIE Isis, 1822, 549.—AUD. Synop. 1839, 28; B. A. Am. i, 1840, pl. 38.—CASS. Illustr. 1854, 182.—SCL. & SALV. Nom. Neotr. 1873, 116.
- Otus (Brachyotus) brachyotus* RIDGW. in B. B. & R. Hist. N. Am. B. iii, 1874, 22.
- Asio brachyotus* MACGILL. Hist. Brit. B. iii, 1840, 461.—STRICKL. Orn. Syn. i, 1855, 209.
- Ulula brachyotus* MACGILL. Rapac. B. Gt. Brit. —, 412.
- Egolius brachyotus* KEYS. & BLAS. Wirb. Eur. 1840, 32, 143.
- "*Strix ulula*" GMEL. (nec LINN.) S. N. i, pt. 1, 1788, 294.—PALL. Zoög. Rosso-As. i, 1831, 322.
- "*Asio ulula*" LESS. Man. i, 1831, 116.
- "*Otus ulula*" CUV. Règ. An. i, 1817, 328.
- Strix tripennis* SCHRANK. Fauna Boica, i, 1798, 112.
- ? *Strix palustris* BECHST. Nat. Deutschl. ii, 1791, 344; ed. 2, ii, 1805, 906.
- Otus palustris* BREHM Vög. Deutschl. 1831, 124.
- Brachyotus palustris* BONAP. Comp. List, 1838, 7; Consp. i, 1850, 51.—GOULD B. Eur. pl. 40; B. Gt. Brit. pl. xxxii.—DEKAY Zool. N. Y. ii, 1844, 23, pl. 12, f. 27.—COUES Key, 1872, 204; Check List, 1873, No. 321; B. N. W. 1874, 306.
- Strix passerina*, Var. B. LATH. Ind. Orn. i, 1790, 66.
- Strix caspia* SHAW Gen. Zool. vii. 1809, 272.
- Strix egolius* PALL. Zoög. Rosso-As. i, 1831, 309.
- Brachyotus egolius* BONAP. Rev. et Mag. Zool. 1854, 541.
- Otus microcephalus* LEACH Syst. Cat. Brit. Mus. 1816, 11.
- Strix brachyura* NILSS. Orn. Suec. i, 1817, 62.
- Otus agrarius* BREHM Vög. Deutschl. 1831, 124.
- Brachyotus agrarius* BREHM Naum. 1855, 270.
- Brachyotus palustris europæus* BONAP. Consp. i, 1850, 51.
- Brachyotus palustris americanus* BONAP. l. c.
- Otus brachyotus americanus* MAX. J. f. O. 1858, 27.
- Otus brevior* LICHT. Nomencl. 1854, 6 (Brazil).—SCHLEG. Mus. P.-B. Oti, 1862, 4.
- Brachyotus leucopsis* BREHM Naum. 1855, 270.
- Brachyotus cassini* BREWER Pr. Boston Soc. 1856, —; N. Am. Oöl. i, 1857, 68.—CASS. Baird's B. N. Am. 1858, 54; Orn. U. S. Expl. Exp. 1858, 108.—BAIRD Cat. N. Am. B. 1859, No. —.
- Otus cassini* Gray Hand-l. i, 1869, 51.
- Otus brachyotus* *β. cassini* RIDGW. Field and Forest, June, 1877, 210.
- Asio accipitrinus*, *β. Asio cassini* SHARPE Cat. Striges Brit. Mus. 1875, 238.
- Strix sandwichensis* BLOX. Voy. Blonde, 1826, 250 (Sandwich Islands).
- Asio sandwichensis* BLYTH Ibis, 1863, 27.
- Asio accipitrinus*, *δ. Asio sandwichensis* SHARPE, l. c.
- Brachyotus gmelinii* MALM. Göteborg. och Bohusl. Fauna, 1877, 75.
- La Chouette* BUFF. Pl. Enl. 488.
- Caspian Owl* LATH. Synop. i, 1785, 147.

## 2. ASIO PORTORICENSIS Ridgw.

### (Porto Rican Short-eared Owl.)

- "*Otus (Brachyotus) brachyotus*" RIDGW. (part) in B. B. & R. Hist. N. Am. B. iii, 1874, 25 (spec. ex Porto Rico).
- "*Brachyotus cassinii*" GUNDL. J. f. O. 1874, 307, 310.
- Asio portoricensis* RIDGW. MSS.

### 3. ASIO GALAPAGOENSIS (Gould) Strickl.

(Galapagoan Short-eared Owl.)

*Otus (Brachyotus) galapagoensis* GOULD PZS. 1837, 10 (Galapagos).

*Brachyotus galapagoensis* BONAP. Consp. i, 1850, 51.—GASS. Illustr. B. Cal. Tex. etc. 1854, 183.

*Otus galapagoensis* DARWIN Voy. Beag. Birds, iii, 1844, 32, pl. 3.—GRAY Genera B. i, 1844, 40; List. B. Brit. Mus. —, 108; Hand-l. i, 1863, 51.

*Asio galapagoensis* STRICKL. Orn. Syn. i, 1855, 211.

*Brachyotus palustris*, c. *galapagoensis* COUES Birds N. W. 1874, 307.

"*Asio accipitrinus*" SHARPE Cat. Strig. Brit. Mus. 1875, 234 (part).

*Asio accipitrinus*, γ. *Asio galapagoensis* SHARPE t. c. 238 (Galapagos).

SMITHSONIAN INSTITUTION, January 13, 1881.

### DESCRIPTION OF TWO NEW RACES OF MYADESTES OBSCURUS LAFR.

By LEONHARD STEJNEGER.

During a recent examination of the species of the genus *Myadestes*, I have found that *M. obscurus* ought to be divided into three distinct races. I am indebted to the kindness of the authorities of the National Museum for the opportunity of describing them.

Prof. S. F. BAIRD in his "Review" of American Birds, I, p. 431, has already remarked, that "in specimens from Western Mexico, Tonila, and Tres Marias, the ash of head invades the back," and that "the rufous of the back is paler." But I find, also, that the specimens from the continent and those from the islands mentioned differ from each other so essentially in other particulars, that I have thought it convenient to separate them as follows:

a<sup>1</sup> Head and neck slate-colored, rest of upper parts brownish olive.

1. *M. obscurus* LAFR.

a<sup>2</sup> Head, neck, and fore part of the back lighter ash-colored, changing gradually into the paler olivaceous of the remaining upper parts.

b<sup>1</sup> First primary not longer than the longest of the primary coverts; the second shorter than the seventh. Only the three outer tail-feathers tipped with white. Innermost secondaries without light edges on the tip.

2. *M. obscurus* var. *occidentalis* STEJNEGER.

b<sup>2</sup> First primary much longer than the longest of the primary coverts, the second equal to the seventh. All the tail-feathers distinctly tipped with white. Innermost secondaries with the tips light-edged.

3. *M. obscurus* var. *insularis* STEJNEGER.

### MYADESTES OBSCURUS Lafr.

*Myadestes obscurus* LAFR. Rev. Zool. 1839, p. 98.—BAIRD, Rev. Amer. Birds, I, p. 430.—SCLAT. and SALV. Exot. Ornith. pt. iv, p. 49, pl. xxv.

DESCR.—(U. S. Nat. Mus. No. 30722. Volcan de Fuego, Guatemala, Nov., 1861. O. SALVIN.)—Slate-gray, the back brownish olive, more

rusty on the fore part, and more olivaceous on the rump and upper tail-coverts; upper head and neck gray, the latter slightly washed with olivaceous, the forehead scarcely lighter. Round the eye a pure white ring; chin, a stripe from the nostrils to above the eye, and another from the base of the lower mandible, between the black of the lores and line bordering the chin to below the eye dull whitish, fading out gradually into the gray of the sides of the head and the throat. The flanks are strongly suffused with olivaceous, the remaining under parts very slightly so, the middle of the belly and the edges of the under tail-coverts becoming dull white. Wing feathers brownish black, edged with bright rusty on the outer web; the concealed base and edge of the inner web of secondaries and inner primaries light buff, forming two large patches on the under side of the wing. Tail-feathers black, except the middle pair, which are gray, tinged with olive, especially on the outer web; the exterior pair has the outer web and the apical half of the inner one light grayish buff, the edge of the light-colored part and the tip being white; the next pair has only a wedge-shaped and similar colored patch towards the tip; the third pair with a narrow tip of white. Feet brown; bill brownish black.

*List of specimens examined, and their dimensions.*

U. S. National Museum catalogue number.	Locality.	When collected.	From whom received.	Sex and age.	Length of 1st primary.	Length of 2d primary.	Wing.	Tail to basal end of feathers.	Tarsus.	Middle toe and claw.	Bill: Exposed culmen.	Bill: Along gape.
13660	Orizaba, Mex	Nov., 1861	SCLATER .....	—ad	23	63	100	97	20	.....	11	19
30722	Volc. de Fuego, Guat		SALVIN .....	—ad	22	61	99	96	20	20	11	19
37500	Orizaba, Mex		SUMICHRIST .....	—ad	24	66	102	95	20	20	12	19

*Wing formula.*

United States National Museum catalogue number.	Distance from the tip of the longest primary to the tip of the—						
	1st.	2d.	3d.	4th.	5th.	6th.	7th.
	mm.	mm.	mm.	mm.	mm.	mm.	mm.
13660 .....	56	13	3	0	0	2	11
30722 .....	55	14	5	1	0	3	11
37500 .....	54	13	3	0	1	5	14

*Hab.*—High table-land of Southern Mexico and Guatemala.

*MYADESTES OBSCURUS* var. *OCCIDENTALIS* Stejneger.

*Myiadestes obscurus* LAFR. apud BAIRD, Rev. Amer. Birds, i, p. 430 (*part*).

DESCR.—(*U. S. Nat. Mus. No. 35038.*—♂ *ad.* Tonila, Jalisco, October, 1863. JOHN XANTUS.) Light slate-gray, only the interscapulars,



hind back, rump, and upper tail-coverts suffused with olive, somewhat rusty on the middle of the back; the head, neck, and upper back gray, forehead as light as the chin. Flanks pure gray without olive tinge. In other respects the colors agree with the typical form, excepting that the gray on the under parts is lighter and purer, and the rusty on the wings paler and more mixed with olive.

*Dimensions*.—Length of the first primary, 18<sup>mm</sup>; of the second, 66<sup>mm</sup>. Wing, 105; tail to basal end of feathers, 101; tarsus, 21; middle toe with claw, 19; exposed culmen, 11; and commissure, 18<sup>mm</sup>.

*Wing formula*.—Distance from the tip of the longest primary to the tip of the 1st, 63; 2d, 16; 3d, 4; 4th, 0; 5th, 1; 6th, 4; and 7th, 13<sup>mm</sup>.

*Hab*.—Southwestern coast of Mexico and Guatemala.

*Remarks*.—The chief differences between the typical *obscurus* and the above-described race consist in the rather duller shade of the gray, and the brighter color of the rusty in the former, and in the absence of the rusty or olive wash on the fore part of the back and the flanks in the latter. In many respects it comes very near to *Myadestes elisabeth*, but is easily distinguishable from this species by having the wings more rusty, and the upper head and fore part of the back pure gray.

MYADESTES OBSCURUS var. INSULARIS Stejneger.

*Myiadeses obscurus* LAFR. apud BAIRD, Rev. Amer. Birds, i, p. 430 (part).—LAWR. Proc. Bost. Soc. Nat. Hist. 1871, p. 277, and Extr. p. 19.

DESCR.—(*U. S. Nat. Mus. No. 37327*.—♂ ad. *Tres Marias Islands, Jan., 1865*. Col. A. J. GRAYSON.) In color this race shows very great resemblance to the foregoing, the olive-colored part of the back being only a trifle more rusty. It differs, however, in having the light forehead decidedly tinged with olivaceous buff, as also the light malar stripe; besides, the flanks are slightly tinged with olive. The most striking differences, however, are the light buff edges on the tip of the innermost secondaries, and the small, but very distinct and pure white spot on the tip of *all* the tail feathers. GRAYSON (LAWR. l. c.) gives the color of the eyes and the feet as black; but the latter are in the three specimens before me clear amber brown.

*List of specimens examined, and their dimensions.*

U. S. National Museum catalogue number.	Locality.	When collected.	From whom re- ceived.	Sex and age.	Length of 1st primary.	Length of 2d primary.	Wing.	Tail to basal end of feathers.	Tarsus.	Middle toe and claw.	Bill: Exposed culmen.	Bill: Along gape.
37327	Tres Marias Islands ..	Jan., 1865	Colonel GRAYSON..	♂ ad.	23	67	100	102	23	21	11	17
37328	.....do .....	Jan., 1865	.....do .....	♂ ad.	24	65	98	96	23	22	11	15
55051	.....do .....	.....	.....do .....	♂ ad.	22	65	97	96	22	21	11	19



Colonel Grayson gives (l. c.) the total length of the male, measured fresh, to 7.90 inches.

*Wing formula.*

United States National Museum catalogue number.	Distance from the tip of the longest primary to the tip of the—						
	1st.	2d.	3d.	4th.	5th.	6th.	7th.
	mm.	mm.	mm.	mm.	mm.	mm.	mm.
37327 .....	53	9	2	0	0	3	10
37328 .....	50	10	1	0	0	2	10
55051 .....	51	10	1	0	0	2	10

*Hab.*—Tres Marias Islands.

*Remarks.*—This insular race is distinguishable from the var. *occidentalis* mainly by its less pointed wings and the longer first primary. In color, the two races agree very well, except that the bird from the Tres Marias Islands shows a faint olive wash all over. From both the other forms it may be easily distinguished by the light edgings on the inner secondaries, and the very distinct white tip of the tail feathers, which is to be found also on the three middle pairs. It seems that this character is constant, and that it does not depend on seasonal change or more or less good state of the feathers. All the specimens, which I have examined, seem to have been collected in the winter, and the quills are in all of them in a quite perfect state.

WASHINGTON, D. C., January 12, 1882.

## DESCRIPTIONS OF TWO NEW THRUSHES FROM THE UNITED STATES.

By **ROBERT RIDGWAY.**

### 2a. *HYLOCICHLA FUSCESCENS SALICICOLA* subsp. nov.

(*Willow Thrush.*)

*Turdus fuscescens* BAIRD, B. N. Am. 1858, 922, 927 (Ft. Bridger, Wyoming); Rev. Am. B. i, 1864, 17 (part; spec. from Ft. Bridger).—ALLEN, Bull. M. C. Z. iii, 1872, 155, 173 (Mts. of Colorado).—RIDGW. Bull. Essex Inst. 1873, 172 (Salt Lake Valley, Utah); Bull. Essex Inst. 1873, 179 (Colorado); *ib.* 1875, 35 (Provo R., Utah); Orn. 40th Paral. 1874, 398 (valleys of Bear, Provo, and Weber R's, Utah; breeding).—HENSHAW, Ann. Lye. N. Y. xi, 1874 (Utah); Rep. Wheeler's Exp. 1874, 39, 56, 71 (do.); Zool. Wheeler's Exp. 1875, 148 (Denver & Ft. Garland, Colorado; breeding).—COUES, B. N. W. 1874, 5 (part).

*Turdus (Hylocichla) fuscescens* COUES, B. Col. Val. 1878, 39 (part).

CH.—Similar to *H. fuscescens*, but averaging decidedly larger, the upper parts much less tawny, and the jugulum less distinctly buff. Wing, 3.80–4.25 (4.02); tail, 2.95–3.40 (3.20); culmen, .55–.60 (.57); tarsus, 1.15–1.28 (1.17); middle toe, .65–.75 (.69).\*

\* Extreme and average measurements of 11 adults.

*Adult in spring.*—Above uniform russet-olive (much as in *H. ustulata*); jugulum and lower part of throat pale buff, as in *ustulata*, much lighter than in *fuscescens*, the markings, however, small and narrow as in the latter. Sides of head dull grayish, without trace of lighter orbital ring; sides of breast, sides, and flanks ash-gray (rather deeper than in *fuscescens*), the breast very faintly or not at all spotted with darker.

*Adult in fall and winter.*—Above darker, more umber, brown; jugulum and lower part and sides of throat deeper buff, with much darker spots.

The general appearance of this bird at first glance is more that of *H. ustulata* than true *H. fuscescens*, the upper parts and anterior lower parts being quite similarly colored. A close examination, however, immediately reveals radical differences, the most important of which is the total absence of any light orbital ring, which is always present, and very distinct, in *ustulata*. The wings and tail, instead of being appreciably more rufescent than the back and rump are, on the other hand, less so; the buff of the jugulum gives way very abruptly to the ash-gray on the sides of the breast, and the spots end quite as abruptly, the breast being plain ash-gray laterally, and white medially, with very indistinct spots of grayish between the white and the gray. In *ustulata* the sides are decidedly brown, with very distinct transverse spots of a darker shade of the same color entirely across the breast. Another excellent character consists in the color of the axillars and lining of the wing, which are light grayish in the present bird, and deep brownish buff in *ustulata*.

The differences from typical *fuscescens* of the Atlantic States, as indicated in the above diagnosis, are exceedingly constant.

A specimen from Chicago, Ill., in the collection of H. K. Coale, of that city (No. 1568, Coll. H. K. C., Sept. 16), is referable to this race, and is evidently a fall straggler from the Rocky Mountain district. It is even more olive above than most specimens from that region, having almost exactly the same shade of color as a fall specimen of *H. swainsoni* from Massachusetts, the latter, however, an unusually brown example. The entire absence of any light orbital ring, the narrow, almost linear, streaks of the jugulum, and the peculiar proportions, however, refer it at once to *fuscescens*.

I have called this new form *salicicola* on account of its marked predilection for willow thickets, to which, along the streams in the valleys and lower cañons of the Rocky Mountain region, it is chiefly confined during the breeding season.

## List of specimens examined.

## MALES.

Catalogue number.	Locality.	Age.	Date.	Wing from carpal joint.	Tail to basal end of feathers.	Tarsal joint.	Middle toe.	Culmen.
79461 N. M.	Fort Garland, Colo .....	Ad.	May 28	4.25	3.40	1.20	.70	.55
66667 N. M.	.....do .....	Ad.	May 26	4.10	3.30	1.15	.70	.60
66668 N. M.	.....do .....	Ad.	May 17	4.20	3.25	1.15	.70	.55
66689 N. M.	.....do .....	Ad.	June 10	4.10	3.25	1.20	.65	.58
10882 N. M.	Fort Bridger, Wyo .....	Ad.	May 28	4.00	3.10	1.15	.68	.58
	Average .....			4.13	3.26	1.17	.69	.57

## FEMALES.

79460 N. M.	Fort Garland, Colo .....	Ad.	June 19	4.00	3.25	1.12	.65	.55
69898 N. M.	Laramie, Wyo .....	Ad.	May —	3.80	2.95	1.10	.70	.55
10881 N. M.	Fort Bridger, Wyo .....	Ad.	May 27	3.90	3.05	1.15	.68	.58
	Average .....			3.90	3.08	1.12	.68	.56

## SEX NOT DETERMINED.

65051 N. M.	Fort Rice, Dak .....	Ad.	June 14	4. 05	3. 20	1. 15	. 71	. 55
41519 N. M.	Montana Territory .....	Ad.	May —	4. 05	3. 30	1. 28	. 75	.....
65893 N. M.	Souris River, Dakota .....	Ad.	Sept. 16	4. 00	3. 30	1. 20	. 68	. 60
	Average of sex not determined .....			4. 03	3. 27	1. 21	. 71	. 57
	Average of males .....			4. 13	3. 26	1. 17	. 69	. 57
	Average of females .....			3. 90	3. 08	1. 12	. 68	. 56
				12. 06	9. 51	3. 50	2. 08	1. 70
	Average of both sexes .....			4. 02	3. 20	1. 17	. 69	. 57

Below is given a list of the specimens of *H. fuscescens* examined in this connection, with their measurements.

## MALES.

Catalogue number.	Locality.	Age.	Date.	Wing from carpal joint.	Tail to basal end of feathers.	Tarsal joint.	Middle toe.	Culmen.
— H. W. H.	Washington, D. C. ....	Ad.	Sept. 13	4.00	3.10	1.05	.65	.53
82511 Nat. M.	Fairfax County, Virginia .....	Ad.	Sept. 6	4.05	3.10	1.18	.72	.57
2145 Nat. M.	Carlisle, Pa. ....	Ad.	Apr. 26	4.15	3.00	1.20	.70	.60
26 E. P. B.	Riverdale, N. Y. ....	Ad.	Aug. 28	4.00	3.05	1.20	.70	.50
28 E. P. B.	.....do .....	Ad.	Aug. 26	3.90	3.00	1.12	.72	.50
690 E. P. B.	.....do .....	Ad.	Sept. 28	4.00	2.90	1.20	.70	.55
142 H. W. H.	Cambridge, Mass .....	Ad.	May 26	3.90	3.00	1.18	.70	.58
— H. W. H.	.....do .....	Ad.	June 12	3.80	3.05	1.25	.70	.58
63058 Nat. M.	.....do .....	Ad.	.....	4.10	3.10	1.18	.70	.58
63062 Nat. M.	.....do .....	Ad.	.....	4.15	3.05	1.20	.70	.60
82508 Nat. M.	.....do .....	Ad.	May 21	4.15	3.30	1.25	.70	.60
13698 Nat. M.	Rainy Lake, Manitoba .....	Ad.	May 29	4.00	2.90	1.10	.70	.60
63847 Nat. M.	Pembina, Dak .....	Ad.	June 14	4.00	3.10	1.20	.....	.58
	Average .....			4.01	3.05	1.18	.70	.57

## List of specimens examined—Continued.

## FEMALES.

Catalogue number.	Locality.	Age.	Date.	Wing from carpal joint.	Tail to basal end of feathers.	Tarsal joint.	Middle toe.	Culmen.
— H. W. H.	Washington, D. C. . . . .	Ad.	Sept. 13	3.85	2.90	1.15	.70	.52
273 H. W. H.	Cambridge, Mass. . . . .	Ad.	Sept. 18	3.80	2.80	1.12	.70	.52
82510 Nat. M.	Concord, Mass. . . . .	Ad.	May 16	3.80	2.90	1.10	.65	.52
989 Nat. M.	Carlisle, Pa. . . . .	Ad.	May 18	3.75	3.00	1.12	.....	.58
503 E. P. B.	Riverdale, N. Y. . . . .	Ad.	Sept. 2	3.70	2.70	1.10	.65	.52
587 E. P. B.	.....do.....	Ad.	June 9	3.85	3.00	1.20	.70	.60
27 E. P. B.	.....do.....	Ad.	Sept. 4	3.75	2.85	1.12	.70	.55
	Average of females.....			3.79	2.88	1.13	.68	.54
	Average of males.....			4.01	3.05	1.18	.70	.57
				7.80	5.93	2.31	1.38	1.11
	Average of both sexes.....			3.90	2.96	1.15	.69	.55

## 3a. HYLOCICHLA ALICIE BICKNELLI Ridgw.

(*Bicknell's Thrush.*)

CH.—Similar to *Hylocichla alicie* Baird, but much smaller and (usually) with the bill more slender. Wing, 3.40–3.80 (3.65); tail, 2.60–2.90 (2.75); culmen, .50–.52 (.5); tarsus, 1.10–1.25 (1.13); middle toe, .65–.70 (.68).

*Hab.*—Breeding near the summit of Slide Mountain, Ulster County, New York (BICKNELL), and probably in other mountainous districts of the northeastern United States; in migrations mixed with *H. alicie*.

Mr. Eugene P. Bicknell, of Riverdale, N. Y., has very kindly given me permission to describe the present new Thrush, which no one else appears to have met with. The above diagnoses and following remarks are based entirely upon the specimens in Mr. Bicknell's collection, which are the only ones I have seen. It is also proper to state here that the differences presented by these specimens from true *H. alicie* were first noticed by Mr. Bicknell, and by him pointed out to me.

The seven specimens upon which this new race is based are uniformly very much smaller than true *H. alicie*, with slenderer bills, and present also certain slight but rather indefinite peculiarities of coloration. After a very careful comparison, however, I am unable to find any constant color-differences which can be expressed in a diagnosis. Some specimens, notably the two males from Slide Mountain (where Mr. Bicknell found the present bird breeding in company with *H. ustulata swainsoni* and *H. unalascae pallasi*, and having very distinctive habits and notes as compared with the two species in question), have the upper parts much browner than in *alicie*, with the wings and tail appreciably more reddish. In fact, the general aspect of the upper parts approaches more closely that of *H. ustulata*, but the shade is much darker

and less fulvous, while, as in typical *alicie*, there is no trace of a lighter orbital ring. The bill is much more slender than in most specimens of the larger form, while in several examples it is of a very peculiar shape, being much depressed basally, with the middle portion of the culmen somewhat concave. In fact, the bill in these specimens is much like that of the Nightingale (*Luscinia philomela*) in shape, but with even a more prominent angle at the base of the gonys, and still more depressed at the base. The extreme form of the bill, in this respect, as exhibited in No. 653 (coll. E. P. B.), suggests very strongly that of *Cinclus*.

Mr. Bicknell sends me the following notes, based upon his specimens:

"In regard to the differences of coloration of the two forms, I find that, though some specimens in my series can be closely matched, the majority can be separated by color differences. These, however, are not very tangible, but most specimens of the smaller form present a somewhat undefinable appearance, which separates them from the larger. This is best seen about the head, and seems to be produced by a brownish shade relieving those colors which in true *alicie* are dark and sooty. Though my two Catskill examples are darker than spring specimens of *alicie*, specimens of the smaller form taken in the fall are quite uniformly paler than those of true *alicie* taken at the same season; and though this seems to be contrary to a recognized law of geographical distribution, it certainly is the fact. Besides in the general color it is noticeable in the legs and feet, some of the smaller forms having the tarsi a pale clear yellow, while in many large specimens they are uniformly dark. The base of the lower mandible is also more largely and generally yellow in the smaller form."

*List of specimens examined.*

MALES.

Catalogue number.	Locality.	Age.	Date.	Wing.	Tail.	Tarsus.	Middle toe.	Culmen.
345 E. P. B.	Riverdale, N. Y .....	Ad.	May 24	3.75	2.80	1.15	.70	.52
632 E. P. B.	.....do .....	Ad.	Sept. 29	3.70	2.80	1.10	.70	.52
652 E. P. B.	Slide Mountain, N. Y .....	Ad.	June 15	3.70	2.90	1.10	.68	.52
653 E. P. B.	.....do .....	Ad.	June 15	3.75	2.90	1.25	.70	.52
	Average .....			3.72	2.85	1.15	.69	.52

FEMALES.

706 E. P. B.	Riverdale, N. Y .....	Ad.	Oct. 8	3.40	2.60	1.10	.68	.50
23 E. P. B.	.....do .....	Ad.	Sept. 27	3.80	2.70	1.12	.65	.50
	Average .....			3.60	2.65	1.11	.66	.50

SEX UNDETERMINED.

17 E. P. B.	Riverdale, N. Y .....	Ad.	(Fall.)	3.55	2.75	1.15	.70	.51
				3.72	2.85	1.15	.69	.52
	Average both sexes .....			3.62	2.75	1.14	.68	.51



For comparison, I give below measurements of all the specimens of *H. aliciae* Baird examined in connection with the present subject:

## MALES.

Catalogue number.	Locality.	Age.	Wing from carpal joint.	Tail to basal end of feathers.	Tarsal joint.	Middle toe.	Bill above.	Date.
18072 Nat. M.	Groswater Bay, Labrador .....	Ad.	4.30	3.00	1.20	.68	.58	July 24
323 H. W. H.	Cambridge, Mass. ....	Ad.	4.20	3.20	1.20	.70	.55	Sept. 28
339 H. W. H.	do .....	Ad.	3.85	3.05	1.20	.70	.52	Sept. 30
340 H. W. H.	do .....	Ad.	4.20	3.15	1.25	.72	.55	Sept. 30
82512 Nat. M.	do .....	Ad.	4.10	3.05	1.20	.65	.57	Oct. 5
63064 Nat. M.	do .....	Ad.	4.00	3.00	1.18	.72	.52	
77170 Nat. M.	Cook County, Illinois .....	Ad.	4.30	3.10	1.20	.70	.55	May 8
82519 Nat. M.	Mount Carmel, Ill. ....	Ad.	4.10	3.00	1.15	.70	.50	Oct. 15
82516 Nat. M.	Fairfax County, Virginia .....	Ad.	4.40	3.25	1.20	.70	.58	May 10
25213 Nat. M.	Washington, D. C. ....	Ad.	4.25	3.20	1.25	.68		Sept.—
70160 Nat. M.	Saint Michaels, Alaska .....	Ad.	4.20	2.90	1.18	.70	.57	
81304 Nat. M.	do .....	Ad.	4.20	3.00	1.20	.67	.55	June 5
81334 Nat. M.	Kodiak, Alaska. ....	Ad.	4.30	3.00	1.15	.67		July 13
4708 Nat. M.	Vermilion River .....	Ad.	4.25	3.05	1.18	.70	.52	
54368 Nat. M.	Yakuts, Alaska. ....	Ad.	4.10	2.85	1.15	.70	.52	June 12
240 E. P. B.	Riverdale, N. Y. ....	Ad.	4.20	3.40	1.30	.72	.55	May 21
541 E. P. B.	do .....	Ad.	4.25	3.15	1.30	.75	.52	Sept. 25
339 E. P. B.	do .....	Ad.	4.35	3.20	1.20	.70	.55	May 21
691 E. P. B.	do .....	Ad.	4.20	3.25	1.15	.70	.58	Sept. 29
— E. P. B.	do .....	Ad.	3.85	3.10	1.12	.67	.52	Sept. 30
18 E. P. B.	do .....	Ad.	4.15	3.20	1.25	.70	.55	Oct. 11
697 E. P. B.	do .....	Ad.	4.00	3.00	1.19	.71	.52	Oct. 4
25 E. P. B.	do .....	Ad.	4.15	3.10	1.22	.71	.55	Oct. 14
707 E. P. B.	do .....	Ad.	3.95	3.00	1.20	.72	.58	Oct. 8
	Average .....		4.16	3.17	1.20	.70	.55	

## FEMALES.

— H. W. H.	Grantville, Mass. ....	Ad.	3.90	2.85	1.15	.75	.57	May 23
— H. W. H.	do .....	Ad.	3.75	2.85	1.18	.65	.58	May 4
63066 Nat. M.	do .....	Ad.	4.10	3.10	1.15	.68	.57	
— H. W. H.	Washington, D. C. ....	Ad.	3.90	2.95	1.20	.68	.58	Oct. 12
— H. W. H.	do .....	Ad.	4.05	3.00	1.25	.70	.55	Oct. 12
82515 Nat. M.	do .....	Ad.	3.90	2.90	1.18	.65	.45	Sept. 26
59301 Nat. M.	do .....	Ad.	3.90	3.00	1.15	.70	.57	Sept. 29
71153 Nat. M.	Fort Sisseton, Dak. ....	Ad.	4.10	2.90	1.12	.60	.55	May 23
55502 Nat. M.	Fort Macon, N. C. ....	Ad.	4.20	3.20	1.15	.70	.58	May 4
22607 Nat. M.	Fort Simpson, British America .....	Ad.	4.05	2.90	1.20	.68	.57	Sept. 10
43194 Nat. M.	Fort Anderson, British America .....	Ad.	3.95	2.90	1.12	.65	.52	June 11
43205 Nat. M.	do .....	Ad.	4.05	2.90	1.12		.55	June—
19 E. P. B.	Riverdale, N. Y. ....	Ad.	4.00	3.05	1.15	.68	.57	Oct. 18
623 E. P. B.	do .....	Ad.	3.95	2.85	1.15	.65	.50	Oct. 2
	Average of females .....		3.99	3.02	1.16	.67	.55	
	Average of males .....		4.16	3.17	1.20	.70	.55	
			8.15	6.19	2.36	1.37	1.10	
	Average of both sexes .....		4.07	3.09	1.18	.68	.55	

**BENTHODESMUS, A NEW GENUS OF DEEP-SEA FISHES, ALLIED TO LEPIDOPUS.**

**By G. BROWN GOODE and TARLETON H. BEAN.**

The United States Fish Commission has recently received from Capt. Roderick Morrison, of the Gloucester fishing schooner *Laura Nelson*, a remarkable fish, taken from the stomach of a halibut caught on the western edge of the Grand Bank of Newfoundland in eighty fathoms

of water. The specimen represents a species first made known by F. E. Clarke in Transactions and Proceedings of the New Zealand Institute, (xi, 1878, p. 294, pl. xiv) under the name *Lepidopus elongatus*. Clarke had seen eight or ten examples, all taken at Hokitika, on the South Island of the New Zealand group. Hokitika is in about south latitude  $43^{\circ}$  and east longitude  $171^{\circ}$ . A remarkable range is thus discovered for this singular *Trichiurid*. The species differs in so many important characters from *Lepidopus* and other allied genera that we are forced to establish for it a new genus more nearly related to *Evoxymetopon* Poey and *Lepidopus* Gouan than to any other forms at present known to ichthyologists. Its distinctive characters may be formulated as follows:

**BENTHODESMUS** new genus, **TRICHIURIDÆ**.

Body naked, much compressed, attenuate, tapering gradually from vent to base of caudal. Caudal peduncle very slender, supporting a small but well-developed caudal fin. Vent considerably nearer to head than to tail.

Lateral line simple, in a deep, wide furrow, nearly straight, in front of the vent gradually ascending to the scapular region.

Head compressed, its upper profile nearly horizontal; snout gibbous near its end, as in *Lepidopus*.

Top of head very flat, concave between the eyes, with no occipital crest. Interorbital ridges not elevated.

Eyes large, slightly postmedian. Operculum oblong, reaching a little beyond the base of the pectoral fin. Nostrils horizontal, in front of the eyes.

Supramaxillary not extending to vertical from front of eyes. Lower jaw with stout cutaneous appendage.

Three very long, simple, compressed teeth on each intermaxillary in front; outside of these a few minute teeth, and behind them a row of large acicular teeth. In lower jaw a single row of moderately large acicular teeth, more numerous than in the upper jaw, largest in the middle of the jaw. Palatine teeth minute.

Dorsal fin, beginning above the operculum, nearly uniform in height throughout its entire length, and continuous almost to the caudal. Rays very numerous (over 150 in *B. elongatus*). Anal beginning near the vent, preceded by a single scale-like appendage; spines very numerous (numbering with the rays about 100 in *B. elongatus*, all except 28 or 30 being spines), minute and almost hidden; a short fin posteriorly.

Caudal small, normal, forked.

Pectoral fins inserted almost horizontally, with lower rays longest, and its upper outline rounded.

Ventral fins represented each by a minute scale-like spine, inserted below the origin of the pectorals.

Pseudobranchiæ present; gills 4, a slit behind the fourth.

Gill-rakers short and spiny, in a single series on the first and second

arches, almost obsolete on the the third and fourth. (In *Lepidopus caudatus* all the arches are supplied with several series of rakers.)

Type, *Lepidopus elongatus* Clarke.

*Benthodesmus* may be distinguished from *Lepidopus*, the most closely related genus, by the following salient characters:

1. The slenderer, lower form of the body, the height of which in *B. elongatus* at the vent is one-fourth the length of the head, in *Lepidopus caudatus*, nearly half the length of the head.

2. In the location of the vent, which is considerably nearer to the head.

3. In the straighter course of the lateral line, and the greater size of the furrow in which it is situated.

4. In the depressed form of the head, its flat profile, the insignificance of the frontal ridges, and the absence of the occipital crest.

5. In the horizontal instead of oblique position of the nostrils.

6. In the extension of the opercula beyond the origin of the pectorals, and in the rounded upper outline of the pectorals.

7. In the much greater number of dorsal rays.

8. In the more advanced position of the rudimentary ventrals, which are situated in *Benthodesmus* under the base of the pectorals, in *Lepidopus* under their tips.

9. In the presence of a single small postanal scute, in place of the two larger ones in *Lepidopus*.

10. In the characteristic arrangement of the gill-rakers.

#### BENTHODESMUS ELONGATUS (Clarke) Goode and Bean.

Extreme length of type (No. 29116), 896 millimeters (35½ inches).

Body attenuate, its height at the vent contained four times in length of head, its width being about one-third of its height at the point mentioned. Length of caudal peduncle half of greatest height of body. Least height of tail one-third width of interorbital area.

Length of head contained 7½ times in length of body, its greatest width one-sixth of its length; its greatest height nearly one-fourth of its length; width of interorbital area (on the bone) one-fourth of the height of the head. Length of snout contained 2½ times in length of head. Upper jaw not reaching to vertical from anterior margin of eye, and equal in length to the postorbital portion of head. Lower jaw in length equal to about twice the greatest height of body. Mandibular tip nearly one-third as long as the diameter of the eye. Eye slightly postmedian in location, the orbital diameter equal to half the length of the snout.

Besides the three long teeth, there are on each intermaxillary 8 or 9 of moderate size; on one side many small intermediate teeth are present. The number of teeth in the lower jaw varies from 13 on the one side to 21 on the other.

The first branchial arch has 13 gill-rakers, the longest of which meas-

ures about 2 millimeters. The second arch has about the same number, while on the third there are but 6 or 7, very small, and present only in the angles, while in the fourth there are about the same number, very inconspicuous.

The dorsal fin originates above the middle of the operculum, and at a distance from the snout equal to twice the length of the snout.

The anal fin is composed of about 100 spines and rays. Owing to the mutilation of the specimen it is impossible to determine how many there are of each, but there are supposed to be about 28 rays normally united by a membrane into a fin.

The caudal is also imperfect, but the middle rays are seen to be about half as long as the remnants of the external rays. The fin is supposed to resemble in shape that of *Lepidopus caudatus*.

The pectoral originates under the tip of the opercular flap. Its outline is rounded above instead of emarginate, as in *Lepidopus caudatus*. Its longest ray equals in length the postorbital part of the head.

The ventrals originate at a distance from the snout equal to that of the base of the pectorals from the same point. They are rudimentary and represented by minute scutes, the length of which is  $3\frac{1}{2}$  millimeters in the specimen before us, and about equal to half the interorbital width.

Branchiostegals 7; D. 154; A. 100; P. 12; V. I.

Cæcal appendages 8 in the specimen examined. Some, however, may have been lost, the abdominal viscera having been partly digested by the halibut, in the stomach of which it was found.

Color: Uniform silvery, with traces of dark color upon head and tail.

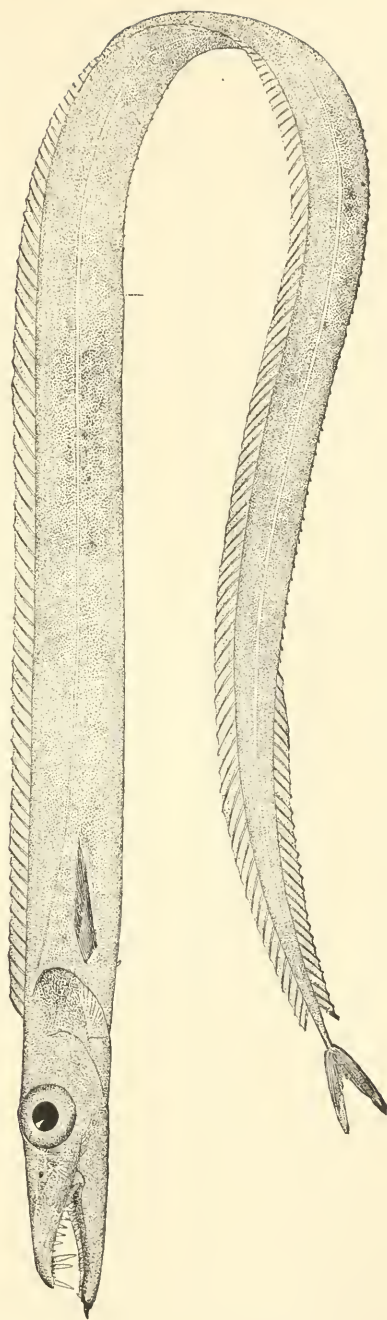
### Measurements.

Taken by Capt. Roderick Morrison (schooner Laura Nelson), from the stomach of a halibut.

Current number of specimen, 29116.

Locality, western edge of Grand Bank, 80 fathoms.

	Millimeters.
Extreme length .....	896 = ( $35\frac{1}{2}$ inches.)
Length to origin of middle caudal rays.....	878
Body:	
Greatest height .....	33
Greatest width.....	13
Height at ventrals .....	33
Height at anus .....	30
Least height of tail .....	2
Length of caudal peduncle .....	16
Head:	
Greatest length .....	116
Greatest width.....	20
Width of interorbital area (on the bone).....	6
Length of snout.....	47
Length of upper jaw .....	42
Length of mandible.....	69
Length of mandibular tip.....	6
Distance from snout to orbit.....	47
Diameter of eye.....	22



BENTHODESMUS ELONGATUS (Clarke) Goode & Bean.





Dorsal ( <i>spinous</i> ):	
Distance from snout.....	94
Length of longest ray.....	20
Length of last ray.....	7
Anal:	
Distance from snout.....	350
Length of longest ray.....	9
Caudal:	
Length of middle rays.....	8
Length of external rays.....	17 +
Pectoral:	
Distance from snout.....	110
Length.....	42
Ventral:	
Distance from snout.....	111
Length.....	3½
Branchiostegals.....	VII
Dorsal.....	154
Anal, about.....	100
Pectoral.....	12
Ventral.....	I, I
Number of caecal appendages.....	8 (?)
U. S. NATIONAL MUSEUM, Washington, D. C., Dec. 30, 1881.	

**DESCRIPTION OF A NEW SPECIES OF POMADASYS FROM MAZATLAN, WITH A KEY TO THE SPECIES KNOWN TO INHABIT THE PACIFIC COASTS OF TROPICAL AMERICA.**

**By DAVID S. JORDAN and CHARLES H. GILBERT.**

*Pomadasys cæsius* sp. nov.

Allied to *P. pacifici* (Gthr.).

Head, 3½ in length (3¼ with caudal); depth, 2½ (2⅔ with caudal).

Length (28158), 9⅕ inches; D. XII, 16; A. III, 9; scales, 6-52-13.

Body ovate, compressed, the back rather strongly arched; anterior profile rather steep and straightish, gibbous between eyes and also behind them, slightly depressed above eyes and at the nape. Ventral outline considerably arched. Caudal peduncle moderate, about half as long as head, and somewhat longer than deep.

Head short and deep; deeper than long. Snout very short, blunt and thick, about one-third length of head. Mouth very small, the maxillary not quite reaching to the front of the eye, its length (from tip of snout) 3¼ in head. Teeth cardiform, in broad bands, the outer series enlarged, but smaller than in *P. pacifici*. Eye large, 3½ in head, shorter than snout, about one-fourth wider than the broad preorbital. Lips thick. Chin with a median furrow and two pores; lower jaw included. Anterior nostril much larger than posterior. Preopercle rather weakly serrate, its upright limb somewhat concave. Gill-rakers short and weak, about 10 on lower limb of arch.

Scales rather large, arranged as in related species, those above the

lateral line forming series parallel with the back, but placed so that the cross rows are very oblique. Soft parts of vertical fins almost entirely covered with small scales; series of scales also on membrane of pectorals and ventrals. Scaly sheath of vertical fins well developed.

Dorsal fin low, rather deeply emarginate, its spines very strong, the second spine slightly longer than the eye, and two-thirds the height of the third, which is but little shorter than the fourth or longest, and about two-fifths length of head; soft rays more than two-thirds height of longest spines. Caudal rather large, moderately forked, the upper lobe somewhat the longest, about four-fifths length of head. Anal rather low, its distal margin perfectly straight, vertical; second anal spine very robust, half length of head, half longer than the third spine, which is much lower than the soft rays. Ventral fins  $1\frac{1}{3}$  in head, about reaching vent. Pectoral fins long, subfalcate, a little longer than head, nearly or quite reaching anal.

Color in life, grayish-silvery above, with yellowish tinge; lower part of sides with indistinct darker streaks, formed by clusters of dark points on the margins of the scales. A faint dark bar, most distinct in the youngest specimens, extending from the region in front of the dorsal to, or a little below, the base of pectorals. In young specimens this bar is as wide as the eye, growing narrower below, but in the adult it is scarcely wider than the pupil. No trace of the black cross-bars seen in *P. dorii* and in *P. pacifici*, nor of the dark spots seen in *P. furthii*, nor of the lengthwise stripes of *P. bilineatus* and *P. virginicus*. Vertical fins and pectorals dusky yellowish; distal half of ventrals and base of anal blackish. Upper part of head dusky, especially between eyes. Lining of opercle pale, with yellow patches in life. Peritoneum white.

This species is known from three specimens (28158, 29632, and 28333), obtained in the harbor of Mazatlan. It was not seen at Panama.

The species of *Pomadasy*s thus far known from the Pacific coast of tropical America may be readily distinguished by the characters given in the following table:

ANALYSIS OF SPECIES OF POMADASYS FOUND ON THE PACIFIC COASTS OF MEXICO  
AND CENTRAL AMERICA.

- a. Anal fin short, its rays III, 7 to III, 10; dorsal fin deeply emarginate, its spines more or less robust.
- b. Anal spines strong, the second longer and much stronger than third.
- c. Soft dorsal and anal with series of scales extending on the rays; outer teeth in upper jaw enlarged.
- d. Body ovate; back elevated; depth greater than length of head; outer teeth moderately enlarged, pointed; lips thick.
- e. Scales above lateral line in oblique series, not parallel with the lateral line
- f. Scales rather small, 50 to 70 in a horizontal series.

(ANISOTREMUS\* Gill.)

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\* = *Genytremus* Gill = *Paraconodon* Bleeker.

- g.* Color golden, with about seven light blue horizontal stripes, each edged above and below with paler; a dark band downward, and one forward and downward from nape; pectoral longer than head; second anal and third dorsal spines subequal, half head.....VIRGINICUS.\*
- gg.* Color olivaceous; a jet black bar from anterior part of dorsal to below middle of side; base of pectoral, and membrane of opercle black; pectoral longer than head; second anal and fourth dorsal spines about equal, shorter than head ..... DAVIDSONI.†
- ggg.* Color olivaceous, the adult nearly plain, the young with two black longitudinal stripes; fins blackish; second anal spine longer than fourth dorsal, about half head.....BILINEATUS.‡
- ff.* Scales large, about 7-34-12. Color grayish, each scale on upper anterior part of body with a blackish spot; fins more or less dusky; pectoral a little shorter than head; second anal spine robust, half length of head, longer than fourth dorsal spine.  
FÜRTHI.§
- ee.* Scales above lateral line in series parallel with the lateral line.
- h.* Dorsal spines rather low, the longest about half length of head; second anal spine half length of head.
- i.* Color plain grayish-silvery; a faint bar downward from nape; pectoral longer than head, about reaching anal; dorsal spines stout and short, two-fifths length of head; eye but half wider than the broad preorbital; dorsal rays, XII, 16.....CÆSIUS.
- ii.* Color dusky grayish, with four irregular blackish cross-bands, which grow faint with age; pectorals much shorter than head, not reaching tips of ventrals; dorsal spines comparatively slender, half length of head; eye more than twice as wide as the narrow preorbital; dorsal rays, XI, 14.  
PACIFICI.||

\* *Sparus virginicus* L. Syst. Nat. x, 1, 281, 1758 = *Anisotremus tenuatus* Gill, Proc. Ac. Nat. Sci. Phila. 1861, 107, etc. *Habitat*: West Indies; Caribbean Sea; Brazil; both coasts of Mexico and Central America; Magdalena Bay (*Steind.*); Mazatlan (*Gilb.*); Panama (*Gill*; *Gilb.*).

† *Pristipoma davidsoni* Steind. Ichthyol. Beitr. iii, 6, 1875. *Habitat*: Southern California; Santa Catalina Island (*Jordan* & *Gilbert*); San Diego (*Steind.*; *Jor.* & *Gilb.*).

‡ *Pristipoma bilineatum* Cuv. & Val. v, 271, 1830 = *Pristipoma melanopterum* C. & V. v, 1830, 273 = *Geytrenus interruptus* Gill, Proc. Ac. Nat. Sci. Phila. 1861, 256. *Habitat*: Both coasts of Mexico and Central America; West Indies; Peru; Brazil; San Diego (*Steind.*); Magdalena Bay (*Steind.*); Cape San Lucas (*Gill*); Gulf of California (*Lockington*); Panama (*Steind.*); Galapagos Islands (*Steind.*). Not obtained by Mr. Gilbert.

§ *Pristipoma fürthi* Steindachner, Ichthyol. Beitr. v, 4, 1876. *Habitat*: Mazatlan (*Gilbert*); Panama (*Steind.*; *Gilb.*).

|| *Conodon pacifici* Günther, Proc. Zool. Soc. Lond. 1864, 147. *Habitat*: Chiapam (*Gthr.*); Panama (*Steind.*; *Gilb.*).

hh. Dorsal spines very high, the longest two-thirds length of head; second anal spine nearly two-thirds length of head; color grayish-silvery, with five jet black cross-bands; pectorals much shorter than head.

DOVU.\*

dd. Body oblong, the depth less than the length of the head; outer teeth much enlarged, blunt; preopercle very sharply serrate.....(CONODON Cuvier.)

j. Color silvery, with eight dark cross-bands; snout not obtuse; second anal and fourth dorsal spines strong, half length of head; pectoral shorter than head; caudal lunate .....NOBILIS.†

cc. Soft dorsal and anal destitute of scales or very nearly so; form oblong; scales above lateral line in series parallel with the back.

k. Outer teeth in upper jaw slightly enlarged, acute.

(POMADASYS.‡ Lac.)

l. Dorsal spines 12; vertex convex; preorbital broad.

m. "Scales rather small (8-56-20); fourth dorsal spine  $2\frac{3}{4}$  in head; second anal spine more than half head; pectorals not reaching vent; snout produced; coloration uniform".....HUMILIS.§

mm. Scales larger (6-48-14); longest dorsal spine nearly half length of head, about equal to second anal spine; pectorals long, about reaching vent; snout sharp, protruding; color grayish, with four faint dark cross-bands..MACRACANTHUS.||

ll. Dorsal spines 13; vertex with a small but evident concave depression; head low; preorbital narrow.

n. Dorsal spines very high, the highest more than half length of head; color grayish-silvery, nearly plain .....BRANICKI.¶

kk. Outer teeth in upper jaw not enlarged.

(PSEUDOPRISTIPOMA Sauvage.)

o. Third dorsal spine produced, much longer than the others, and about half length of head; second anal spine somewhat shorter; profile convex; scales nearly smooth; pectoral very long, nearly

\* *Pristipoma dovii* Günther, Proc. Zool. Soc. Lond. 1864, 23. *Habitat*: Mazatlan (Gilb.); Panama (Gthr.; Gilb.).

† *Perca nobilis* Linn. Syst. Nat. x, 1, 291 = *Conodon plumieri* Gthr. i, 304, 1859 = *Conodon plumieri* Streets Bull. U. S. Nat. Mus. vii, 50, 1877 = *Conodon antillanus* C. & V. v, 156, 1830. *Habitat*: Coast of Texas, West Indies, to Brazil. Recorded by Streets from Boca Soledad, Pacific coast of Lower California; not observed by other collectors.

‡ = *Pristipoma* Cuv. & Val.

§ *Pristipoma humile* Kner & Steindachner, Sitzsber. Akad. Wiss. Münch. 1863, 222. *Habitat*: Rio Bayano, Panama (Kner & Steind.); not seen by other collectors.

|| *Pristipoma macracanthum* Günther, Proc. Zool. Soc. Lond. 1864, 146. *Habitat*: Mazatlan (Steind.; Gilb.); Punta Arenas (Gilb.); Chiapam (Günther); Panama (Gilb.).

¶ *Pristipoma branickii* Steindachner, Denkschr. Kaiserl. Akad. Wissen. Wien. xli, 28, 1879. *Habitat*: Tambez (Steind.); Panama (Gilbert); Mazatlan (Gilbert).



- as long as head; preopercle weakly serrate; color silvery; lower fins white; a distinct dark blotch on opercle, and a fainter one on sides below spinous dorsal .... PANAMENSIS.\*
- bb.* Anal spines weak, the second little, if any, longer or stronger than the third, and both lower than the soft rays; body oblong, not elevated; soft dorsal and anal rays with series of scales; scales above lateral line in series parallel with the back; color grayish, with light and dark stripes along the rows of scales, these often obscure.
- (HEMULOPSIS Steind.)
- p.* Pectoral fin long, nearly as long as head; a black blotch below in the axil, encroaching on the lower rays of the fin; preorbital broad, about as wide as eye..... AXILLARIS.†
- pp.* Pectoral fin short, much shorter than head; axillary spot, if present, not encroaching on the fin.
- q.* Preorbital narrow, not so wide as eye; a round dark humeral blotch; anal spines very small, graduated ..... NITIDUS.‡
- qq.* Preorbital very deep, wider than eye; anal spines not graduated ..... LEUCISCUS.§
- aa.* Anal fin long and low, its rays III, 11 to III, 13; dorsal fin low, scarcely emarginate, its spines slender; anal spines small, graduated; scales small, those above lateral line in oblique series ... (ORTHOPRISTIS Gill.||)
- r.* Dorsal spines 12; soft parts of dorsal and anal naked; preorbital very deep, as deep as eye; scales small, about 8-60-15.
- s.* Body oblong-ovate, the depth considerably more than one-third length; profile from nape, straight or slightly concave; pectorals long,  $3\frac{1}{4}$  in body; body brownish above, with faint dark cross-bands and oblique pale streaks.
- CHALCEUS.¶

\* *Pristipoma panamense* Steindachner, Ichthyol. Beitr. iii, 8, 1875. *Habitat:* Mazatlan (Gilb.); Panama (Steind.; Gilb.).

† *Pristipoma axillare* Steindachner, Ichth. Notiz. viii, 7, 1869. *Habitat:* Mazatlan (Steind.; Gilbert).

‡ *Pristipoma nitidum* Steindachner, Ichthyol. Notiz. viii, 5, 1869. *Habitat:* Mazatlan (Steind.; Gilb.); Panama (Gilb.).

§ *Pristipoma leuciscus* Günther, Proc. Zool. Soc. Lond. 1864, 147. *Habitat:* Lower California (Streets); Mazatlan (Gilbert); San José (Gthr.), Chiapam (Gthr.), Panama (Gthr.). Two of our Mazatlan specimens of this species agree with Dr. Günther's description and figure, in having the anal spines rather large, the second larger than third,  $2\frac{3}{4}$  in length of head; the remaining specimens from Mazatlan and Panama are slenderer, with more pointed snout and deeper suborbital, the anal spines being quite small, the second  $3\frac{3}{4}$  to 4 in head. These perhaps represent a different species or variety, but we are not prepared to give it a separate name.

|| = *Microlepidotus* Gill = *Pristocantharus* Gill.

¶ *Pristipoma chalceum* Gthr. Proc. Zool. Soc. Lond. 1864, 146 = *Pristipoma kneri* Steind. Ichth. Notiz. viii, 1869, 3. *Habitat:* Mazatlan (Steind.; Gilb.); Panama (Gthr.; Gilb.).

- ss. Form oblong-elliptical, the depth less than one-third length; profile slightly convex; pectoral short,  $4\frac{1}{2}$  in body; sides with longitudinal dark streaks ..... CANTHARINUS.\*
- rr. Dorsal spines 13 (or 14); soft parts of dorsal and anal scaly; preorbital very narrow, its width much less than diameter of eye; pectoral long, as long as head,  $3\frac{1}{2}$  in body; scales very small; color grayish, with narrow oblique dark streaks.....INORNATUS.†

INDIANA UNIVERSITY, January 3, 1882.

## THE RAPID PREPARATION OF LARGE MYOLOGICAL SPECIMENS.

By M. FÉLIX PLATEAU,

*Professeur à l'Université de Gand.*

(Read before the "Association Française pour l'avancement des Sciences," Congrès de Reims, 1880. Séance du 13 Août, 1880.)

[Translated by H. C. Yarrow, M. D., for the Smithsonian Institution, Washington.]

The laboratory of comparative anatomy of the University of Gand is of restricted dimensions. Its surroundings, sufficient for elementary practical teaching, are very modest, but, happily, material for study is not wanting, thanks, above all, to the administration of the Zoological Garden of Antwerp, one of the richest of the continent, which generously donates to us its losses and carries the obligation still farther in sending to us the bodies of animals by express. It is thus that during the academical years of 1879 and 1880 we have had at our disposal a series of very rare monkeys, a kangaroo, a cheetah or hunting leopard, a young American ostrich, the principal viscera of an adult African elephant, and other interesting specimens.

With the assistance of a single helper I have been able to utilize all these objects and rapidly prepare, during the few hours which my other duties leave me, a great number of permanent anatomical preparations to enrich our museum, which is already comparatively complete.‡ Our

\* *Pristipoma cantharinum* Jenyns, Zool. Voy. Beagle, Fishes, 49, 1842. *Habitat*: Guaymas (Lieut. Nichols); Galapagos Islands (Jenyns; Gthr.).

† *Microlepidotus inornatus* Gill, Proc. Ac. Nat. Sci. Phila. 1862, 256 = *Pristipoma brevipinne* Steind. Ichthyol. Notiz. viii, 1869, 10 = ? *Pristipoma notatum* Peters, Berlin. Monatsber. 1869, 706. *Habitat*: Cape San Lucas (Gill); Mazatlan (Steind.; Peters). Not obtained by Mr. Gilbert.

‡ The collections at Gand actually contain more than 3,000 preparations belonging properly to comparative anatomy, and more than 1,600 specimens are preserved in alcohol.

collections being relatively poor in preparations of the muscular system, I have above all endeavored to fill this want. We have, indeed, made many preparations of the entire muscular system of animals of medium size.

As the solution of this problem, *i. e.*, how to make rapidly and at a trifling cost, in a laboratory of second rank, large permanent myological preparations might interest professors of comparative anatomy and zoology, I have thought it best to briefly relate the method which I have employed.

Having a horror of dried and varnished preparations, I have endeavored to prepare muscular specimens with phenolized glycerine, easily handled, and which could constantly serve for demonstration. With us the muscles are red, the tendons white; in a word the uninitiated would believe that they saw the fresh muscle.\*

In order that I may be well understood I will give a *résumé* of the easy operations to which we have subjected a very large monkey, the *Cynocephalus sphinx*, in order to prepare the whole of its muscular system.

The animal being skinned, care being taken of the superficial muscles or muscles of the skin, the abdomen having been split longitudinally and the viscera removed, it was first of all necessary to preserve this specimen from decomposition, and to employ a process which would permit us to dissect all the muscles at our pleasure.

It is impossible to use alcohol for animals of this size; the body is simply plunged into a saturated solution of the alum of commerce. The muscles in a short time are capable of being indefinitely preserved, and all the conjunctive elements, aponeuroses, tendons, sheathes of the nerves, &c., acquire a firm consistence and become very white.

Whenever the specimen is required for dissection it is taken from its bath, and when the work is over it is replaced.

We have thus been able to dissect at our leisure all the muscles of the *Cynocephalus*, continuing the labor for at least ten days.

Having finished the dissection, it becomes necessary to impart to the muscles their original color. It is in this operation that I employ, and always successfully, the process which I have exemplified since 1874, and which is based on the property that carmine presents, *viz*, in forming when in the presence of alum an insoluble red laquer.†

The animal having been dissected and taken out of the bath, is plunged in pure water for twenty-four hours; this is done in order to get rid of the excess of alum.

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\* Our scholars are generally deceived up to the very moment when we explain to them the mode of preparation.

†Note on a process for giving or imparting the red color to muscles preserved in alcohol.—(*Bulletin de l'Académie Royale de Belgique, 2<sup>e</sup> série, tome XXXVIII, Nos. 9 et 10, 1874.*)

Pure powdered carmine, a little chrome yellow, and liquor of ammonia are the only substances necessary. The carmine is deposited on an earthenware dish; the ammonia is employed as water is by the water-color painter, and traces of chrome yellow correct the tints which are too purple. Finally, the white surface of the plate serves as a background on which the tints may be criticized.

The muscles of the specimen are painted with the aid of an ammoniacal solution of carmine, taking the precaution not to cover the tendons or bones, and in general those parts which should remain white. In fact, these parts are protected by wrapping them separately in strips of tolerably thick paper.

It is unnecessary for me to recall the fact that carmine tints the muscles and penetrates them to a certain depth.

This operation finished, it is next in order to fix the tint. For this purpose the specimen is simply replaced in the bath of alum. An insoluble red laquer is formed, constituting two coats, the one superficial and pulverulent (this comes from the bottom of the liquid), the other penetrating much deeper into the muscular tissue itself and remaining fixed in the tissue.

From this time forth the carmine is fixed and the muscles are red, having the appearance of fresh flesh, and may be handled for an indefinite period without soiling the fingers of the operator with their coloring matter. Specimens which we thus prepared in 1872, have been used every year in the comparative anatomy course, and have lost nothing of their value.

The next step is the employment of glycerine. The specimen is plunged into a bath of phenolized glycerine, but, as the alum has already rendered the specimen proof against decomposition, a long maceration is unnecessary, eight days being a sufficient length of time.

Finally, to place the specimen in a definite condition. It is well known how annoying ordinary preparations are in which glycerine has been used, it being necessary to let them drain for several months. Here we have employed a more expeditious method. After having allowed the specimen to drain for some hours, we wrap the members of the animal and the trunk, in fact the entire body, in a covering of white filtering paper, then in many coverings of ordinary gray paper, around the whole of which twine is wound.

One week after, the paper, which has absorbed all the glycerine in excess, is taken off, the abdomen is filled with packing, the body is sewn up, the muscles are restored to their proper position, and the specimen is finished.

Thanks, probably to the alum, the tendons are white and not yellowish, as preparations are when made by ordinary processes. The muscles are never found to be glued together.

To state it briefly, the method is composed of the following opera-

tions: 1st, maceration in alum during the dissection; 2d, washing in pure water; 3d, tinting with carmine; 4th, the fixing of the carmine by alum; 5th, maceration in phenolized glycerine; 6th, getting rid of the excess of glycerine by compression between pieces of absorbent paper.

This is the whole of the process which is warranted by known facts; it is quite inexpensive, simple, and expeditious.

As an example of the rapidity of execution I will cite the following fact: On May 23, of this year, an adult African elephant died in the Zoological Garden of Antwerp. One month after that event we displayed, in one of the exhibition cases of the National Exposition of Brussels the enormous heart of this animal prepared by the above-detailed method.

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#### ON THE CHINNOOK NAMES OF THE SALMON IN THE COLUMBIA RIVER.

By SILAS B. SMITH.

[NOTE.—The following notes were contributed by Mr. Silas B. Smith, a lawyer, at Skipanow, Wash., and a half-breed Chinook, in answer to questions asked by Mr. Charles J. Smith, of Brookfield, Wash. As the Chinook names have a considerable place in our Salmon literature, it seems very desirable to place the facts given by Mr. Smith on record. I give the present accepted names of the different species in foot-notes.—D. S. J.]

The Chinook names for the different varieties, following the order given by you, are as follows:

1st. Chinook Salmon,\* "*E-quinna*" (accent second syllable and give the "a" the broad sound).

2d. Blue-back,† "*Oo-chooy-ha*" (accent first syllable and give the broad sound to "a").

3d. Silver-side,‡ "*O-o-wun*" (accent first syllable). Your next is "Dog Salmon (red)." My mother and all the other Indians I have spoken to on the matter, and some of the whites, maintain that the red-skinned salmon with hooked nose or beak is nothing more or less than the male silver-side, having turned red after inhabiting fresh water, and his nose assuming that shape upon its becoming poor.

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\* *Oncorhynchus chouicha* (Walb.) J. & G. This word "*E-quinna*" is evidently the "*quinnat*" of Richardson.

† *Oncorhynchus nerka* (Walb.) G. & J.

‡ *Oncorhynchus kisutch* (Walb.) J. & G.



They say that there is another species of Salmon that comes in the fall, having transverse dark spots, large teeth, and nose largely curved, but it does not turn red or but little at most. I will give the name and consider it in place of the "Dog Salmon."

4th. Spotted Fall Salmon,\* "*O-le-arah*" (accent on first syllable).

5th. Steel-head,† "*Quan-nesho*" (accent last syllable).

I have been unable to give the right sound in English to the last syllable of the last name. The above is as near as I can make it.

There is another salmon which you did not mention. It comes in the last of the summer run; it is as large if not larger than the spring salmon, but of a darker color and not so fat.

It will make number—

6th.‡ "*Ek-ul-ba*" (accent first syllable).

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#### REMARKS UPON THE OSTEOLOGY OF *OPHEOSAURUS VENTRALIS*.

By DR. R. W. SHUFELDT, U. S. A.

(Read before the Biological Society of Washington, D. C., December 23, 1881.)

Guided, to a great extent, by external characters, modern herpetologists, in the arrangement of our American reptiles, have assigned this lizard to the genus *Opheosaurus*, of the family *Anguidæ*, of the suborder *Diploglossa*. This arrangement brings it very near the genus *Gerrhonotus*, a lizard with which I have osteologically compared it. The external characters are referred principally to the form and disposition of the scales, the presence in *Gerrhonotus* of a ventral line, and the position of the external ear.

*Opheosaurus ventralis* inhabits the entire Austroriparian region, Tennessee, Kansas, and several of the Middle States. It is found lurking in the woods in damp places, frequently burrowing under ground, and is at all times a gentle and harmless lizard. We all know that in common parlance *Opheosaurus* has been termed the Glass Snake, from the fact that when a moderate blow is delivered it, it usually parts with a portion of its tail, the fracture sometimes taking place at one or more points. These ruptures, and they always occur from violence, are invariably postanal, and the part lost is susceptible of reproduction from the locality at which the fracture took place in the lizard's body. Interesting as this part of the natural history of our subject is, it does not rightfully come within the limits of a paper devoted to its osteology,

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\* *Oncorhynchus keta* (Walb.) G. & J.

† *Salmo gairdneri* Rich.

‡ *Oncorhynchus chouicha* (Walb.) J. & G. (Fall run: "Ekewan" of Richardson.)

and I will be obliged to dismiss this characteristic in *Ophiosaurus* here by simply calling the attention of the student to the fact that, as far as my studies have carried me, it appears that true caudal vertebræ are never reproduced in the new tail, be it only a portion or the entire appendage is lost, but in their place we have substituted a series of semi-osseous nodules, that eventually form the bony core to the new part.

The opportunity has not been afforded me to enter very extensively into the occurrence of bone in the exoskeleton of this lizard, but Professor Owen tells us (*Anat. of Verts.*, vol. i, p. 555) that "bone is developed at the base of the scale, forming part thereof, or combining scute and scale, in *Ophisaurus*, *Tribolonotus*, and *Trachysaurus*." We may add to this that there certainly seems to be more or less bone tissue, be it semi-osseous or otherwise, in the tough and brittle plates that overlie the true skull, superiorly. It requires but a very superficial examination of the skull of this snake-like lizard to satisfy the zoötomist that he has before him a creature that, so far as this part of its bony framework is concerned, at least, makes a very near approach to the typical Lacertilian, an indication that is more than likely to be carried out in other parts of its anatomy.

We find the occipital condyle to be uniform in outline, being notched above, with its long axis placed transversely; it stands out quite prominently from the lower margin of the elliptical foramen magnum, which in turn has its long or major axis parallel with the axis of the condyle; prominent though this latter may be, it cannot be said to be pedunculated, but really is sessile, its prominence being greatly due to the segments that support it. The part that the basi and exoccipitals took in its formation is plainly indicated even in the adult by delicate little furrows that mark the boundaries of the original segments.

This condition of the condyle obtains in many of our American lizards, notably in *Gerrhonotus* and in *Sceloporus* and kindred forms among the *Iguanidæ*. Substantial protection is afforded the brain below by the perfect union that has taken place among the bones of the basis cranii, the basisphenoid, basioccipital with the exoccipitals, which latter support tuberos and outstanding paroccipitals. On the other hand, the anterior wall of the brain-case depends solely in the living animal upon thin membranous portions for the defense of the encephalon, the representatives of the ali- and orbitosphenoids. This open space in the articulated cranium is bounded below by the basisphenoid and laterally by the parotic on either side. Above we again find the brain completely guarded by osseous plates, which here are the united parietals, that in turn become indistinguishably amalgamated with the large superoccipital. Mesial, the united parietals ankylosed with the parotics of the brain-case, while anteriorly these bones articulate suturally with the hinder borders of the frontals; no parietal foramen ever existing at this point as found in some lizards. Laterally, each parietal is extended backwards in a diverging limb, that on either side articu-

lates throughout its entire margin with the squamosal overlapping the latter at its termination and abutting against the lateral process of the occipital. In their course these wings of the parietals bend downwards by a gentle curve, which is more abrupt in the shorter skull of *Gerrhonotus*.

The interfrontal suture is persistent, and these bones form the mid-plates at the top of the skull; taken together the plate is narrower behind than it is in front, where it meets the nasals, while on either side it articulates with the lacrymal and postfrontal; a limited portion of this margin being free, it enters into the formation of the superior moiety of the periphery of the orbit. In our *Holbrookia maculata* among the *Iguanidae* we find this interorbital portion of the frontal plate crowded to a mere osseous and median line by the immense orbits. The nasals have united medially just as the frontals have, and they, being now anteorbital, are allowed to curve downwards on either side to meet the maxillaries, while anteriorly they form the upper and posterior margin of either nostril, and receive between them in the middle line the posterior process or nasal process of the premaxillary. This latter bone forms the rounded anterior end of the skull; it also completes the nostril in front and below, this subcircular aperture having its border or periphery eventually made entire by the assistance of the maxillary on either side, it filling in the lower and posterior part. This portion of the skull is formed in a like manner in *Eumeces*, but in this genus the termination of the cranium anteriorly is more acute, being blunter and broader in *Gerrhonotus scineicaudus*. We will complete this view of the cranium by calling attention to the longitudinal foramen that exists anteriorly between the squamosal and parietal on either side.

The lateral aspect of the skull (Fig. 1) presents for examination quite a number of interesting points. We have, posteriorly, a free *os quadratum* that stands as a protecting pillar at the portals of the auditory meatus. This bone has a quadrilateral outline in front, nearly flat, while behind it is deeply concave throughout its length, and supports below an oblong facet, placed transversely

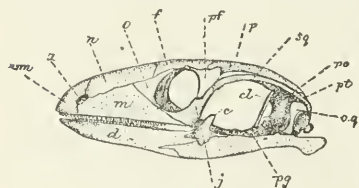


Fig. 1.

for a similar shaped articulating surface on the lower maxilla. Above it is very much expanded, antero-posteriorly, the hinder part of which surface is occupied by the end of the squamosal. This form of the *os quadratum* (o. g., Fig. 1) obtains in *Gerrhonotus* and *Eumeces*, and in fact seems to be but slightly departed from by the vast majority of our lizards. Between the anterior boundary of the *os quadratum* and the posterior boundary of the orbit, and the arching squamosal above that meets both points, there is exposed to view in the skull of this lizard, and, I believe, in all of its congeners, through an open space here existing, the delicate

little *columella* (*cl.*, Fig. 1), that has its superior end abutting against the under surface of the parietal, while its lower rests in a circular socket intended for it, on the upper surface of the middle of the pterygoid. Its lower articulation is anterior to its upper, *i. e.*, the bone leans backwards.

In all of the American lizards that I have examined this bonelet is constant, and Professor Huxley tells us in his *Anatomy of Vertebrated Animals*, page 219, that "In the principal group of the *Lacertilia*, a column-like membrane bone, called the *columella* (but which is not to be, by any means, confounded with the *stapes*, to which the same name is often applied in reptiles), extends from the parietal to the pterygoid on each side, in close contact with the membranous or cartilaginous wall of the skull. Hence they have been called "*Kionocrania*" or "column skulls."

Through this open space we also have lateral views of the pterygoids and the basisphenoid with the parotic and pro-otic bones above and immovably articulated with the latter. There seems to be a small separate ossification wedged in between the squamosal and parietal behind, articulating with the exoccipital and *os quadratum*, that seems to correspond with Professor Huxley's *pterotic*. In the dried skull it is not movable.

The orbit is bounded by three bones: above by the frontal, as already described; anteriorly by the *lacrymal*, that articulates with the jugal by a descending process, anteriorly with the maxillary, nasal, and frontal; while the *postfrontal* and *jugal* bound its posterior moiety, the former bone articulating above with the frontal and parietal, below and posteriorly with the jugal and squamosal, and the latter, the *jugal*, by its anterior process with the lacrymal, by its posterior with the postfrontal and squamosal; thus we see that the orbital periphery is complete. The skull is completed laterally by the *maxillary*; this bone bears teeth in its alveolar process below, articulating with the bones that go to form the roof of the mouth internally, while, upon the aspect of the skull we now have under consideration, it articulates behind with the lacrymal and jugal, above with the nasal, anteriorly with the premaxillary.

The prefrontal fulfills its customary function in constituting in part an osseous septum narium, meeting the ordinary segments as they are arranged in the Lacertilian skull.

Passing to the base of the cranium (Fig. 2), we find the basisphenoid giving off, near its anterior termination, or the base of the rostrum in some vertebrates, on either hand, well-developed *pterapophysial processes* that have dilated extremities to articulate with longitudinally-elongated facets upon the pterygoids. These latter bones form one of the principal features of the basis cranii; they extend backwards, con-

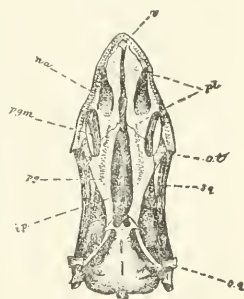


Fig. 2.



verging outwards from the points where they articulate with the processes of the sphenoid, to articulate by movable joints at the anterior and lower angles of the quadrate bones; anteriorly they develop horizontal plates that articulate in front with the palatines, laterally by a process that, on either side, meets the *os transversum*. Their upper surfaces form the greater part of the floor of the orbit, while on their under surfaces they present for examination on either bone a longitudinal row of minute conical teeth, the row being double behind and produced anteriorly so that a few of them are found upon the palatines beyond. The palatines complete the roof of the mouth distally, leaving between them quite an extensive palatine fissure that ceases when it meets the vomer where that bone dips down to lend its aid in establishing the septum narium. A palatine starting from the oblique pterygoidal articulation proceeds forwards by a rather broad horizontal plate that, as it comes opposite the maxillary, throws off an external and lateral process to meet that bone and close in the "nasal aperture" behind; it then turns inwards to the commencement of the palatine fissure, to proceed by a much broader plate that bounds the nasal aperture internally, and only terminates by quite an extensive articulation with the maxillary laterally, and with the premaxillary and vomer anteriorly, curling outwards to complete the aforesaid nasal vacuities. On either side an *os transversum* is found; this little bone is wedged in between the maxillary and jugal on its outer side, while it articulates with a process coming from the palatine on its inner, thus forming quite an important element in completing the floor of the orbit and the base of the cranium.

The bones are arranged at the base of the cranium and roof of the mouth, in nearly all lizards, so as to encircle and bound certain foramina or vacuities; these have been described by Owen and named by that distinguished anatomist as, first, the "interpterygoidal vacuity," the largest of all, a mesial, open, elliptical space in our subject bounded by the pterygoids and palatines laterally, the basisphenoid behind, and continuous with the palatine fissure anteriorly; the next, being parial, are the "pterygo-maxillary" vacuities; these occur on either side, and are bounded laterally by the maxillary and *os transversum*, internally by the pterygoid and palatine; while, finally, we have the "nasal apertures," bounded on their outer sides by the maxillaries, behind and internally by the palatines. In *Gerrhonotus*, the skull being broader, these apertures are consequently wider; otherwise the general arrangement of the bones at the base of the skull is the same. In examining the eye, we discover the *sclerotals* to be present, as they are in *Ares*. They are quadrate in outline, slightly overlapping each other, and number from eighteen to twenty in the average number of specimens examined.

The rami of the lower maxilla are turned outwards, so that the alveola processes are the most external; this condition is so much increased after we pass the coronoid bones that the sides of the jaw become nearly



horizontal. They terminate by quadrate plates that tend to approach the median plane, these horizontal plates protruding in the articulated skull back of the articular facets and the quadrate bones. Broadly oblong, and raised above the general level of the bone, the articular facets look upwards and a little backwards and outwards. The *coronoid bones* are placed, one on either side, slightly posterior to the middle point of the ramus; they project upwards and backwards as laterally-compressed processes that show externally still fairly-developed traces of their original sutures; upon this aspect, also, we observe the irregular sutural line, indicating the point of ending of the dentary portion of the maxilla.

Each ramus is perfectly smooth beneath, being gently convex from side to side, broadly so longitudinally. The external curve about the symphysis is parabolic in outline, the inner being sharply acute, and, passing backwards as the inferior ramal border, maintains a more or less parallel position with the external or alveolar border. Ankylosis is never thoroughly established between the dentary elements at the symphysis, this joint having an articulation very similar to the symphysis pubis of anthropotomy, the interested bones coming apart upon very slight provocation in the dried skeleton, showing each articular face to be roughened for an amphiarthrosial joint.

In the specimens that I have examined, the teeth in the upper jaw seem to invariably pass completely round the alveolar process, while in the lower jaw a few always seem to be lacking on either side of the

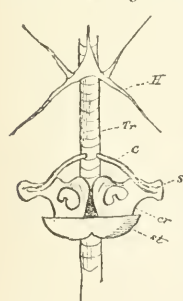


Fig. 4.

symphysis; this is also the case in *Gerrhonotus*, but not so in a specimen of *Eumeces skiltonianus*. These teeth are of the *pleurodont* type; in other words, they are ankylosed to an outer alveolar plate, as in many of the *Iguanidae*. Above their points of union to the alveolar process they are conical in form, pearly white, and glistening, being arranged in a row of some seventeen to twenty in each ramus, the largest being

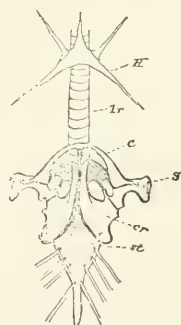


Fig. 5.

found in the middle and the smallest at either end. The *hyoidean arch* seems to be largely cartilaginous in structure, though a good deal of bone tissue does exist in it, particularly about the center. In form it resembles the capital letter X, the upper limbs being directed forwards and outwards, the hinder ones backwards and outwards; the body of the hyoid occupying the intersection as an equilateral triangle, with one of the angles placed anteriorly in the middle line, and from which is produced a delicate "glosso-hyal"; the posterior limbs springing from its outer angles, and the anterior ones, apparently by articu-

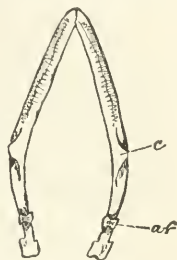


Fig. 3.

lation, from midpoint of its sides. *Gerrhonotus* has a hyoidean arch very similar to the one found in *Opheosaurus*.

In the largest and best specimen that was examined, there were found 147 vertebrae with a series of caudal nodules where a tail had been replaced; there were 52 pairs of ribs, and this number was also found in a smaller specimen. The atlas is characteristic of the usual Lacertilian type, and a stumpy odontoid process is found upon the axis. Free vertebral ribs are not exhibited until we have passed backwards for three or four segments, but when the series commences it is continuous to within one vertebra of the rudimentary pelvis, and even this intervening segment may develop a small free pleurapophysis. These ribs have rounded bodies with laterally compressed and dilated extremities below; the pair when articulated lie in the curve of a broad ellipse that sustains the shape of this lizard's body. They articulate by feebly developed capitula, at the base of the diapophyses, at the very anterior margin of the centrum of each vertebra, in concave facettes placed there for their accommodation. Commencing with the atlas, the first two or three vertebrae support hypapophyses, that are at first directed downwards, then directly backwards in a sharp point; it is with this segment, too, that the quadrate neural spine makes its appearance, to be continued throughout the chain, past the pelvis; to become directed more and more backwards, and more pointed as we pass through the caudal series.

Well-developed pre- and post-zygapophyses are found upon the neural arches of all of the vertebrae, and the cup and ball socket between the centra is ellipsoidal in form and placed transversely on the bone, being concave in front, convex behind. The neural tube, beginning more or less triangular, becomes subelliptical as we pass posteriorly. Caudal vertebrae develop sharp, spine-like diapophyses, that are directed outwards at right angles with the neural spines

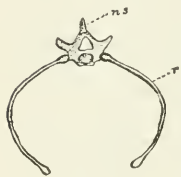


Fig. 6



Fig. 7.

and the chevron bones below, which latter in these segments are in each case a wedge-formed hypapophysis, attached to each vertebra, the triangular hæmal canal passing through them all. The *sternum* and *scapular arch* in *Opheosaurus* is largely cartilaginous, though bone tissue is deposited about the points, where in the higher lizards the glenoid cavity exists, and other localities where additional strength is required. So far as my examinations have extended I have thus far failed to discover the presence of a rudimentary pectoral limb; even the very semblance of the glenoidal socket appears to be missing. The clavicles do not meet in the median line, but their outer extremities articulate with the expanded blade of the scapula on either side, which latter bone is semi-osseous only. A transverse plate, covering the lower borders of the coracoids, is the sole representative of a sternum. The entire apparatus is placed immediately over the trachea, while the outer and expanded blades of the scapulae lap over the first and second pleurapophyses.

Taken as a whole we could hardly look for a better example of a rudimentary apparatus throughout, even to its minor details. In *Gerrhonotus*, all of the points that are so feebly developed in *Opheosaurus* have been carried to a still higher point, and one approaching the true Lacerilian type, and although in this lizard the anterior and posterior limbs are present, they are weaker than in other forms, such as the *Iguanidæ*. In *Gerrhonotus* the clavicles meet mesiad, and the coracoids articulate with elongated facets upon a semi-osseous sternum, that has inserted along its sides the hæmapophyses that articulate above with the dorsal ribs. Passing next to the examination of the pelvis, we find that although some parts have been more or less suppressed or have almost passed beyond recognition, we still find a rudimentary femur present. The fifty-seventh vertebra has suspended from its diapophyses, and articulating freely with their extremities, two spoon-shaped bones, one on either side; these do not meet in the median line, but are separated by a space of several millimeters. The dilated extremity of each is below, and from the middle point on the outside surface, rotating in a diminutive acetabulum, we find the rudimentary femur, represented by a

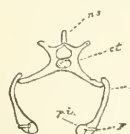


Fig. 8.

minute cylinder of bone, rounded at both extremities. A faint sutural line passing through this cotyloid-cavity indicates the division between the ilium above and the puboischium below. Professor Mivart found this condition in some of the forms he examined, and he tells us in his

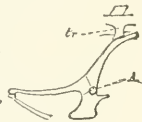


Fig. 9

Lessons in Elementary Anatomy, page 195, that "confining ourselves, therefore, for purposes of comparison, to Mammals, Sauropsida, and Batrachians, we find the femur under a certain aspect more constantly present than the humerus. For although it is often absent when the humerus is present (as in forms like *Siren*, which have pectoral limbs but no pelvic ones), yet it is sometimes present in a more or less rudimentary condition when no representative of the foot coexists with it. Such is the case, *e. g.*, in some whales (as the Greenland whale) amongst mammals, and certain snakes, *e. g.*, *Boa*, and certain lizards, *e. g.*, *Lialis*, amongst the reptiles."

In *Gerrhonotus* all three of the pelvic bones go to form the acetabulum, the pubic elements curving far anteriorly as delicate osseous columns to meet, mesiad, in a common cartilaginous articulation. The arch is suspended in a like manner from the transverse processes of a vertebra.

Though a little foreign to our subject, it will be of interest to many to know something of the character of food of this lizard, and in this Professor Riley has kindly assisted me, and sends the following diagnosis of a stomach that I sent him:

"The contents of stomach of *Opheosaurus ventralis* consists almost entirely of fragments of a tolerably common spider, *Lyeosa ruricola* Hentz, with a single small black seed and seed-pod of some plant, not determinable on account of condition."

Dr. Vasey kindly examined the seed and thinks it may be a *Heliocharis*, but is not certain. Unfortunately, the writer has not had the opportunity, from lack of material, of examining such a form as *Barisia olivacea*, a lizard that Cope has placed as the leading genus under *Gerrhonotidae*; as far as our examination has gone, however, of forms representing other genera, it should leave no doubt as to the soundness of the classification in placing our apodal *Ophcosaurus* in the niche it now occupies.

#### EXPLANATION OF FIGURES.

- FIG. 1.—Left lateral view of skull of *Ophcosaurus ventralis*, life size: *pm.*, premaxillary; 1, nostril; *n.*, nasal; *m.*, maxillary; *l.*, lacrymal; *f.*, frontal; *pf.*, postfrontal; *p.*, parietal; *sq.*, squamosal; *po.*, pro-otic; *pt.*, pterotic; *o. q.*, *os quadratum*; *cl.*, columella; *c.*, coronoid; *d.*, dentary; *j.*, jugal; *pg.*, pterygoid.
- FIG. 2.—Skull of *Ophcosaurus ventralis* seen from beneath, taken from a smaller specimen than Fig. 1, and enlarged: *v.*, vomer; *pl.*, palatine; *o. t.*, *os transversum*; *sq.*, squamosal; *o. q.*, *os quadratum*; *n. a.*, nasal aperture; *pgm.*, pterygomaxillary vacuity; *pg.*, pterygoid; *ip.*, interpterygoid vacuity.
- FIG. 3.—Lower jaw of *Ophcosaurus ventralis*, life size, same specimen as Fig. 1, seen from above: *c.*, coronoid; *a. f.*, articular facet.
- FIG. 4.—Hyoid and scapular arch of *Ophcosaurus ventralis*, life size, seen from in front: *H.*, hyoid; *Tr.*, trachea; *c.*, clavicle; *s.*, scapula; *cr.*, coracoid; *st.*, sternum.
- FIG. 5.—Same from *Gerrhonotus scincicaudus*, letters indicate the same thing: *gl. c.*, glenoid cavity.
- FIG. 6.—Anterior view of vertebra, with its ribs, from *Ophcosaurus ventralis*, from middle of spinal column; *n. s.*, neural spine; *r.*, rib.
- FIG. 7.—Anterior view of caudal vertebra from same specimen.
- FIG. 8.—Anterior view of vertebra that bears the pelvic arch, *O. ventralis*, slightly enlarged: *n. s.*, neural spine; *ct.*, centrum; *I.*, ilium; *p. i.*, pubo-ischium; *F.*, rudimentary femur.
- FIG. 9.—Sketch of lateral view of pelvis of *Gerrhonotus scincicaudus*, slightly enlarged: *tr.*, transverse process of vertebra; *A.*, acetabulum.

#### ON CERTAIN LIMPETS AND CHITONS FROM THE DEEP WATERS OFF THE EASTERN COAST OF THE UNITED STATES.

By W. H. DALL.

I have received from Professor Verrill certain limpets or patelliform shells and chitons collected under his supervision off the southeast coast of New England in deep water by the United States Fish Commission parties in 1881, with his kind permission to describe them. Though without particular beauty and of small size, the hope that these specimens would prove of interest has not been disappointed.

Limpets are generally shore or shallow water mollusks; the connection of certain peculiarities of structure in them with their geographical distribution, and the progressive development indicated by the characters of different genera, have already been the subject of comment by me.\*

\* Sci. Results of the Expl. of Alaska, I, art. II, pp. 41-43, 1876.



The forms of lowest organization and least specialized characters among those already known are those which inhabit the deeper water; hence there was reason to suppose that features of much interest would be exhibited by the few specimens which had just been brought up from much greater depths than any from which limpets had hitherto been obtained.

The examination was rendered more complete by the possession of additional specimens which are contained in the deep-sea collection from the Antilles made by Prof. Alex. Agassiz and Lieutenant-Commander Bartlett, U. S. N., on the United States Coast Survey steamer Blake. These afforded valuable confirmation of impressions derived from the study of the material obtained from Professor Verrill.

Some of the specimens obtained are of unusual interest as showing a combination of characters which has heretofore been unknown in animals of the same order. While the shells present few salient features, the soft parts show extraordinary and unexpected characters. They are divided into representatives of the orders *Rhiphidoglossa*, *Docoglossa*, and *Polyplaciphora*. The *Docoglossa* comprised representatives of both the suborders *Abranchiata* and *Heterobranchiata*, but all somewhat anomalous in their characters. It is in the first-mentioned order, however, that the richest results were obtained, since it appears necessary to separate the three species obtained into two genera, representing each a family, which differs by apparently sound characters from any hitherto known, and which it has therefore been necessary to describe as new.

Almost all the species appear to be blind.

## Order RHIPHIDOGLOSSA.

### Family COCCULINIDÆ Dall.

Shell patelliform, not nacreous, symmetrical, with an entire non-sinuated margin, and a posteriorly inclined apex with a deciduous spiral nucleus. Muscular impression horseshoe-shaped, interrupted over the head.

Animal with a prominent head and muzzle, two tentacles as in *Lepe-  
tidæ*; gill single, plumose, asymmetrical, resembling that of *Aemæidæ*, extending between the under surface of the mantle and the foot (from a point above and behind the head) backward on the right side, attached only at its base. Anus anterior, opening above and behind the head. Mantle margin plain; sides and margin of the foot without papillæ or ornamental processes excepting two filaments, one on each side of the median line, between the mantle and the foot-disk behind. Radula with a small or moderate rhachidian tooth (in the known species), three inconspicuous laterals with denticulate cusps and a fourth dentate,



larger outer lateral;\* uncini numerous (50-150), similar, hooked at the tip, those of each lateral series springing from a common base.

$$\text{Formula: } \frac{1}{m(1+3\cdot3+1)m}.$$

This family differs from its nearest described allies (the *Fissurellidae*) in its single asymmetrical gill, in the absence of appendages to the sides of the foot or on the mantle edge, and in its patelliform, unfissured, unsinuated, and wholly external shell.

From the succeeding family, *Addisoniidae*, it is separated by its symmetry, the character of the gills, and by its dentition. By its dentition it is most nearly allied to *Parmophorus* or *Scutus*, if figures be taken as a criterion (and much resembles some species of *Helicina*), but it must be borne in mind that very few species of *Fissurellidae*, have been figured in proportion to the whole number known. The other characters, however, forbid its incorporation with the *Fissurellidae* as they conflict in nearly every important feature with the definition appropriate to that family.

At first it was thought that *Propilidium* might be incorporated in this family, but an examination of the available data relative to that genus indicates that it belongs rather in the *Fissurellidae*, where it, apparently, represents an imperforate *Puncturella*.

#### Genus COCCULINA Dall.

Animal blind; shell colorless, with radiating and concentric sculpture; for other characters see diagnosis of family.

##### *Cocculina Rathbuni*, n. s.

Shell depressed, white, thin, with sides nearly parallel and their slopes lightly flattened, and with ends similarly broadly rounded; sculpture of faint closely (but irregularly) set grooves radiating from a smooth apex (which has originally a subspirai nucleus) and crossed by concentric growth lines, which are more or less irregular in different individuals; faint yellowish areas seem to indicate a thin, very closely adherent epidermis; apex prominent, more or less incurved and slightly laterally compressed, usually showing a scar where the embryonic nucleus was attached; inside polished or smooth; length 11.0; width 6.5; altitude 2.75<sup>mm</sup>. Another dead specimen is three times larger.

Soft parts: Foot ovate, thin, not very high, somewhat pointed behind; mantle margin moderately wide with a thickened plain border; behind, on each side of the "tail," between the mantle and foot, is one cylindrical blunt filament; sinus above the head and neck quite deep; gill exactly as in *Acmæa*, small, hardly projecting out of the sinus; head large, end of muzzle semi-lunate, with a strongly marked margin; in the midst of this flat lunate area is a rounded papillose space surrounding the mouth; this

\* Much as in *Scutus* as figured by Gray, Guide, p. 163.

organ, if furnished with jaws at all, has them of such soft and cuticular consistency as to show neither under the knife nor under an ordinary dissecting microscope, but it appeared to be without jaws; tentacles moderate, subcylindrical; eyes none; course of the intestine much as in *Patella*, but shorter.

*Dentition*.—Rhachidian tooth squarish, rounded in front, nearly flat, about as long as the two inner laterals; inner three laterals slender, with small denticulate cusps, outer or third usually a little longer than the others, but the proportions slightly different in the less mature part of the radula; fourth or major lateral about twice as long as the others and slightly broader than the rhachidian tooth, rather strongly cusped, the cusp notched into five or six denticles, and the shaft somewhat curved, the shaft and cusp translucent; uncini numerous (100 or more), slender, slightly twisted and hooked, united on each side on a single continuous base, which is a little longer than the width of the radula between the uncini.

*Habitat*.—Station 937 of the United States Fish Commission in 1881. This is 102 miles S. by E.  $\frac{1}{2}$  E., by compass, from Gay Head Light, Martha's Vineyard. The bottom temperature being 40°·5 F., and that of the surface 72°·0 F. The same species was obtained by the United States Coast Survey dredgers on the steamer Blake, Lieutenant-Commander J. R. Bartlett, commanding, under the supervision of Prof. Alex. Agassiz, on hard bottom (temperature 44°·5 F.), at station 288, in 399 fathoms, off Barbadoes; and off Martinique, in 502½ fathoms sand and ooze, at station 195, bottom temperature 41°·0 F., the surface in both cases being about 80°·0 F. I take pleasure in naming this species after Mr. R. Rathbun, of the United States Fish Commission.

*Cocculina Beanii*, n. s.

Shell elevated, white, thin, resembling in sculpture and general features the last species, except in the following particulars: The form of the base is about as in *C. Rathbuni*, but the profile differs widely, the anterior and posterior slopes of the present species, instead of being subequal and nearly similar, are unequal, the anterior being considerably the longer, roundly and conspicuously arched; the posterior slope is about half as long as the other and deeply concavely excavated; this results from the fact that the apex, instead of being depressed and nearly central, is elevated, subposterior and much incurved; like that of the previous species it bears a scar where the (probably spiral) embryonic shell was attached; the sculpture resembles that of the preceding species, being stronger and more cancellated in some specimens and nearly obsolete in others. The very young show proportionally stronger sculpture, even slightly spinous at the intersections in some specimens. The surface is generally partly eroded, probably from the same action as that which so rapidly reduces dead shells and corals to a species of gray ooze in the deep sea. There seems to be no indication of epidermis in this species. Length 8.0; breadth 5.0; height 4.0<sup>mm</sup>.

Soft parts in general as in the last species, except that the head and muzzle are much elongated, the sinus behind the head deep; gill longer and larger than in *C. Rathbuni*, projecting out on the right side of the head; tentacles longer and foot shorter proportionally than in *C. Rathbuni*; the mantle margin is much puckered, but this is probably due to the alcohol; the margination, which forms a semilunar area at the end of the muzzle in the preceding species, in *C. Beanii* is interrupted before the papillose area which here distinctly forms the end of the muzzle, the effect of which is to produce two lappets, one on each side, extending from the end of the muzzle to the anterior edge of the foot. There appears to be no jaw.

*Dentition*.—In this species the bands of uncini are proportionally longer and wider and the rhachidian tooth smaller than in the preceding. The rhachidian tooth is small, with a tridentate cusp and bifurcate base; it is about half as long as and hardly wider than the first three laterals; the latter are elongate, slender, with denticulate cusps, the outer is rather the shorter in the mature part of the radula; the major lateral is longer, with a more slender shaft than in *C. Rathbuni*, and a proportionally larger, very concave cusp with seven or eight denticulations; the banded uncini are singly broader than in *C. Rathbuni*, and collectively about one-half longer.

*Habitat*.—Station 871, U. S. Fish Commission, lat.  $40^{\circ} 02' 54''$  N., lon.  $70^{\circ} 23' 40''$  W., in 115 fathoms muddy sand; station 894, U. S. Fish Commission, lat.  $39^{\circ} 53'$  N., lon.  $70^{\circ} 58' 30''$  W., 365 fathoms mud and gravel, both in 1880; station 947, 312 fathoms sandy mud, bottom temperature  $44^{\circ}$  F.; station 949,  $79\frac{1}{2}$  miles south of Martha's Vineyard, in 100 fathoms yellow mud, bottom temperature  $52^{\circ}.0$ , surface  $66^{\circ}.0$  F.; station 997, 335 fathoms, yellow mud, bottom temperature  $40^{\circ}$  F.; these last in 1881 (Verrill); and from the same localities as *C. Rathbuni* in the West Indies (Agassiz), with the additional locality of station 264, 416 fathoms gray ooze, off Grenada, bottom temperature  $42^{\circ}.5$  F.\* It is named in honor of Dr. T. H. Bean, of the United States Fish Commission.

#### Family ADDISONIIDÆ Dall.

Shell asymmetrical, porcellanous, somewhat like *Capulaemaea* Sars.

Soft parts much as in the last family, but strongly asymmetrical, with an enormously developed lateral series of separately inserted gill-laminae, like those of *Patellidæ*, and without filamentary appendages of any kind. Radula with a large simple rhachidian tooth with, on each side, two large simple transverse laterals, followed by two minute ones, and a large outer lateral with a strong tridentate cusp, outside of which

\* This is, perhaps, the shell referred to under the name of "*Aemaea rubella*? Fabr." Verrill, Proc. U. S. Nat. Mus., III, p. 391, dredged (dead) at station 894, United States Fish Commission, 1880, off the S. E. coast of New England, in  $39^{\circ} 53'$  N.,  $70^{\circ} 58' 30''$  W., in 365 fathoms.

is a single scale-like flat uncinus, bearing an elongated thickened ridge, but no cusp.

$$\text{Formula: } \frac{1}{1 \left( \frac{1}{3} + 2 + 2 \cdot 2 + 2 + \frac{1}{3} \right) 1}.$$

This family might be incorporated with the last were it not for the differences in the branchiæ and in its dentition. These latter are of great weight. The dentition of *Addisonia* is like nothing known in the whole group of *Rhiphidoglossa*, but, while it recalls the dentition of the *Chitonidae* in some features, has a decidedly Docoglossate aspect. Perhaps the most rational hypothesis is that this group bears to the preceding family much such a relation as in *Pulmonata* is borne by the *Cyclotacea* of Troschel toward the *Cyclostomacea*. Indeed, the resemblance of the radula of *Cocculina Rathbuni* to that of some of the species of *Helicina* figured by Troschel is quite remarkable. This family contains, so far as known, but one genus.

#### Genus ADDISONIA\* Dall.

Shell ovate, subconical, strongly asymmetrical, porcellanous, thin; with a blunt apex curved backward, downward, and to the left, without an epidermis; with an unthickened, simple, entire margin; pedal muscular impression horseshoe-shaped, interrupted in front. Soft parts: head provided with two tentacles without eyes or eye tubercles; muzzle plain, simple; foot thin, orbicular, without lateral or posterior tubercles, processes, or fringes; mantle edge simple, thickened; gill composed of leaflets as in *Patella*, the series starting on the right behind the head and continued within the mantle edge backward, the body of the animal being asymmetrically placed with regard to the aperture of the shell to afford room for the enormous series of branchial leaflets; anus opening behind and above the head slightly to the right of the median line, and indicated by a small papilla.

Radula: See description of the family.

Type and only species yet known.

#### *Addisonia paradoxa*, n. s.

Shell ovate, thin, whitish; apex presenting an appearance as if an embryonic tip (perhaps spiral) had fallen and been replaced by a peculiarly blunt ovate apex, which in the young shell is nearly marginal posterior and to the left of the middle line, but in the adult is considerably within the margin, curved downward and backward, and much more asymmetrical; sculpture of faint grooves radiating from the (smooth) apex and reticulated by the stronger concentric lines of growth, beside which the extremely inflated arch of the back is somewhat obscurely

\* In honor of Prof. Addison E. Verrill, of Yale College and the United States Fish Commission, whose surname has already been applied to more than one group of invertebrates.



concentrically waved; over the sculpture the shell has a polished appearance; margins thin, sharp; interior smooth, somewhat polished; the scar of the pedal muscle narrow, a considerable distance within the margin, the anterior ends of the scar enlarged, hooked backward on their inner edges; these ends connected by a line broadly arched forward and marking the attachment of the mantle to the shell over the head. Soft parts whitish, dotted with fine purple dots; mantle edge thickened, smooth; muscular base of the foot nearly orbicular, extremely thin and delicate, not high; muzzle short, plain, without any strongly defined margination, with the end finely papillose and a little puckered; mouth small, furnished with two lateral pads covered by a cartilaginous thin coat which completely dissolves in *liquor potassæ*, and hence can hardly be termed a jaw, though it occupies the place of the buccal plates in other genera; head moderate, not much produced, broader than long, extended laterally into a single rather short and stout tentacle on each side; tentacles showing slight transverse ridges (due to contraction?) destitute of any basal elbow or tubercle, such as bears the eye in allied groups, and with no appearance of any organ of vision or bulbous, whatever. Behind the head a thickened ridge, containing a large vessel, takes origin and passes backward around the right mantle edge, reaching nearly to the posterior median line; from this ridge depend fifty or sixty branchial leaflets resembling those of *Patella*, and not like those of *Acmæa* or the *Fissurellidæ*; these leaflets are very large in proportion to the size of the animal, and gradually diminish posteriorly; they are slightly inclined outward; the anal papilla is very inconspicuous, opening between the line of the branchia and the head, a little to the right of the head; the intestine is much shorter than in the *Patellidæ*, and coiled in much the same way through the very large greenish hepatic mass; this surrounds the ovary, which rises to the surface of the back in about its center, and in this individual was crowded with eggs already in various stages of segmentation and of about the size and general appearance of those of *Acmæa patina*. The ovary appeared to be a single simple sac-like body of irregular contour as in *Acmæa*; no crop was noticed and the stomach seemed of very moderate size.

Since but one specimen was available the observations were more or less imperfect, especially since the internal parts were somewhat softened. To obviate the extreme contraction caused by alcohol, the specimen was placed in water with the result that it almost immediately swelled and became covered with an immense quantity of very slimy mucus, which rendered it almost impossible to handle, being so slippery, and it had to be replaced in alcohol again to harden before the examination could proceed. The edge of the mantle is margined with a rather broad thickened band, apparently without papillæ or other appendages of any kind. The space occupied by the branchiæ is so large that the remainder of the animal is forced a good deal to the left in the aperture of the shell.



The radula has a large flat, ovate central tooth with a thickened anterior edge but no marked cusp; on each side of this two rhomboidal flat laterals with a similarly thickened anterior margin, the inner is the larger and the outer somewhat more rounded in form; close to this are two minute narrow laterals with small cusps, hidden partly under the cusps of the next or major lateral, for which reason they cannot well be made out until the radula is partly torn apart or broken up; these two little laterals are the most anterior of the transverse series, which has a form like a very transverse M; the major lateral has strong Docoglossate features, being set on a flat plate whose posterior inner and anterior outer corners are thickened and raised into the likeness of a pseudo-cusp, the true shaft of the tooth being very short and terminating in a strong tridentate pellucid cusp; the outer tooth is a squarish, plate-like uncinus, exactly as in some chitons, with a thickened longitudinal ridge near the inner margin.

Length of shell about 10.0; width 7.5, and altitude 4.0<sup>mm</sup>.

Dredged by the United States Fish Commission in 1881 at stations 923, 940, and 950 in 96, 130, and 69 fathoms, sandy bottom, about 75 miles S. and W. from Martha's Vineyard. Bottom temperature 52°, which belongs to the warmer bottom area. This very remarkable form would have been called a "synthetic type" by Prof. Louis Agassiz. The shell at once recalls *Capulaemava* (= *Pilidium* Midd.), which, however, is distinctively Tanioglossate in dentition. The details of the branchial leaves resemble those in *Patella*, the position of the branchiæ and the form of the head resemble *Aemava*, the smooth thick mantle margin and absence of eyes are characters found in *Lepetidae*. Some features in the dentition recall *Chitonidae*, and others *Cocculinidae*. The position of the animal in its shell is as in the *Rhiphidoglossa* universally.

Nothing of the kind has been recognized in the collection made by Messrs. Sigsbee and Bartlett, of the U. S. Navy, in the Gulf of Mexico and Antilles, under the supervision of Prof. Alex. Agassiz, on the United States Coast Survey steamer Blake, leading to the supposition that this may be a rather more northern form, though found in the warm area.

## Order DOCOGLOSSA.

### Suborder ABRANCHIATA.

Animal destitute of external branchiæ. Embryonic shell spiral.

#### Family LEPETIDÆ Gray.

*Lepetidae* (Gray) Dall. Ann. Mag. of Nat. Hist. vii, pp. 286-291, April.

#### Subfamily LEPETINÆ.

Animal without eyes, without lateral teeth, with a rhachidian tooth, and erect uncini; muzzle with an entire margin, which is extended back-

ward into a tentacle-like filament on each side; shell patelliform, with a subspiral nucleus, which is generally lost in early life, the permanent tip being erect or anteriorly directed. Typical genus *Lepeta* Gray.

Subfamily LEPETELLINÆ n.

Shell and soft parts as in *Lepetidae*, except that it has distinct eyes and is provided with true lateral teeth and also with scale-shaped uncini. Typical genus *Lepetella* Verrill.

Genus LEPETELLA Verrill.

*Lepetella* Verrill, Am. Journ. Sci. xx, p. 393, Nov. 1880.

Type *Lepetella tubicola* Verrill l. c., also Proc. U. S. Nat. Mus. iii, p. 375, Jan. 1881.

*Habitat*.—In two to four hundred fathoms of the SE. coast of New England (stations 869 and 894, U. S. Fish Commission, 1880) in old tubes of *Hyalinæcia artifex* V. (Coast of Norway in deep water, Sars?)

Professor Verrill has well described this little shell in the articles referred to, as well as its dentition, which he calls Tænioglossate. It is indeed so in one sense, though not in the technical sense of belonging

to the order *Tænioglossa*, which has a formula  $\frac{1}{3,3}$ , while the formula of

*Lepetella* is  $\frac{1}{1(2,2)1}$ , the essential difference being that all *Tænioglossa* have on each side of the rhachidian tooth three laterals and no uncini, while *Lepetella* has two laterals and an uncinus.

The specimens examined by me were dry or from deterioration of the alcohol had become quite soft, and for this reason, perhaps, I could not detect the eyes seen by Professor Verrill so distinctly in the fresh and living animal.\* So far as the external features could be determined there was no difference between them and those exhibited by *Lepeta* or *Cryptobranchia*. The dentition is remarkable, both in relative number of teeth and in presenting the only instance of a well-developed, distinct, scale-like (chitonoid) uncinus yet known in the order. In fact, the radula has throughout distinctly *Chiton-like* features, and bears additional testimony, if such were needed, to the acuteness of Troschel in combining (dental characters only being considered) both chitons and limpets in one dental order. The external form is, of course, partly due to its peculiar habitat; other specimens will, no doubt, eventually be found clinging to some flat surface and of normal shape. It seems to be a northern form, and does not occur in the Blake collections.

\* I have, however, no doubt of their existence. A letter from Dr. J. Gwyn Jeffreys states that a small limpet like *Lepeta*, but with eyes, has been dredged off the coast of Norway by Prof. G. O. Sars, which may probably prove to be *Lepetella*.

## Suborder PROTEOBRANCHIATA.

Animal with external branchiæ. Embryonic shell conical.

## Family ACMÆIDÆ.

Gill plumose, cervical.

## Genus SCUTELLINA Gray.

*Scutellina* Gray, P. Z. S. 1847, p. 163 = *Scutella* Broderip, not Lamarek. Type *S. crenulata* Broderip.

The animal of the typical species of *Scutellina* is unknown; according to Arthur Adams, that of a closely-allied species (*S. ferruginea*) resembles *Acmæa* in its externals, except that the shell is pure white, with prominently reticulated sculpture, and the apex is prominent, pointed, and very anteriorly situated. Mr. Adams distinctly states that the animal has eyes, and it is quite probable that the genus will eventually prove to be a good one.

A specimen was recently obtained, with the dried animal (from some West Indian corals), of a species which is also represented in the Blake collection, and which would probably be referred, from the shell characters alone, to *Scutellina*, though it differs from the received diagnosis of that genus in having a blunt, subcentral, erect apex, much like ordinary *Acmæas*. An examination of the soft parts showed, however, wide differences from any described genus, necessitating the establishment of a new one for its reception.

## Genus PECTINODONTA Dall.

Shell resembling *Scutellina*, with a blunt, subcentral apex. Soft parts resembling *Acmæa*, except in the following details: Animal blind, with the front part of the head between the tentacles and above the muzzle much produced upward and forward, extending considerably further forward than the end of the muzzle. Muzzle margined, with lappets at the outer corners. Jaw thin, translucent. Gill exactly as in *Acmæa*; sides of foot and mantle-edge simple, nearly smooth. Dentition  $\overset{0}{0(1.1)0}$ ; teeth large, with transverse pectinated or denticulate cusps, like those of the large lateral teeth of some Tectibranchs or Nudibranchs.

*Pectinodonta arcuata* n. s.

Shell white, elongate-ovate, moderately elevated, with a blunt, polished apex, on which in young specimens remain traces of the disk-like, chalky, embryonic shell; the slopes from the apex to the ends both convexly arched, margin simple or slightly denticulated by the radiating sculpture; within polished; scars as in *Acmæa*; epidermis none; sculp-

ture externally of fine, uniform, rounded, closely-set threads, radiating from near the apex to the margin, and reticulated by the fine, rather prominent, regular, concentric ridges of growth, both ridges and threads averaging near the margin about three and a half to the millimeter. Lon. from end to end, 14.5<sup>mm</sup>; from apex to anterior end, 5.5<sup>mm</sup>; lat. 10.0<sup>mm</sup>; alt. 5.5<sup>mm</sup>.

*Habitat*.—West Indies; St. Thomas, in coral; Santa Lucia, station 215, in 226 fathoms, Blake expedition.

The examination of a well-preserved specimen showed that the end of the muzzle formed a semilunar area with a distinctly-marked margin and lappets at the posterior corners. In the middle of this flat and nearly smooth area is the mouth, surrounded by a small circular papillose area. The jaw is thin and translucent, but sufficiently strong to resist contraction on the drying up of the soft parts. The radula contains about 175 series of teeth, which are large, with strong cusps, which are turned toward the middle line of the radula and strongly denticulate. The denticulate part, as in most *Docoglossa*, is nearly black, the anterior denticles are larger, the posterior nine subequal in size, the whole number of denticles is twelve; the whole tooth has somewhat the appearance of a coarse curry-comb, and suggests that it is due to a consolidation of the normal three *Docoglossal* laterals rather than the suppression of all but one and the modification of that one.

The protrusion of the anterior arch of the head is very peculiar and remarkable; the foot is rather short for the size of the shell; otherwise the features are those of *Acmæa*, in general. The gill is rather large and exactly as in *Acmæa*.

The number of teeth is the smallest known in any limpet, and none of the same shape have been recorded in the order. It is likely, however, that *Scutellina*, when investigated, will prove to have very similar dentition.\*

## CHITONIDÆ.

Genus CHÆTOPLEURA (Shuttleworth) Cpr.

*Chatopleura apiculata* Say.

*Habitat*.—Station 938, United States Fish Commission, 1881, being 100 miles SE. by E.  $\frac{1}{2}$  E. (magnetic) from Gay Head Light, Martha's Vineyard. The depth was 210 fathoms, green sand and mud, the bottom temperature 40°.5, the surface 72°.0 F.

In these researches only two specimens of *Chitonidæ* were obtained, and these are not of a genus characteristic of the deeps. These specimens were young, but did not differ from young ones of the same species from shallow water. There have been found in depths of 100 fathoms

\* I should be most thankful for a dried or alcoholic specimen of the soft parts of the typical species of *Scutellina* (*S. crenulata* Broderip).



or less along the northeastern coast of New England, and northward, two other tolerably common chitons, one of them *Trachydermon albus* Linné, which does not go to great depths, as far as known, either in the Atlantic or Pacific. In Alaska it is abundant from low-water to 100 fathoms. The other, *Leptochiton cancellatus* Sowerby, occurs off the British Possessions, and may reach a depth of 300 fathoms. Rarer species, which may be found in deep water, are *Leptochiton alveolus* Sars (150 fathoms Gulf of Maine); *Hanleyia mendicaria* Mighels and Adams; *H. debilis* Gray (to 300 fathoms); and *H. tropicalis* Dall, from southern waters (Sand Key, 128 fathoms).

The greatest depth from which chitons have been reported is 1,006 fathoms, at which the *Leptochiton Belknapii* Dall, was obtained in the North Pacific. It has since turned up from Kerguelen in the Challenger collections, and, perhaps, may eventually be found in the North Atlantic.

#### NOTES ON THE GENERA.

The slender side teeth of *Lepeta* are distinguished from true laterals by not being situated on the central longitudinal area of the radula. By their form alone it would be impossible to distinguish them from teeth which are truly laterals, like the inner laterals of *Lepetella*.

Since 1869 (when I revised the classification of the *Lepetidae* and, somewhat later, of the order to which they belong), little by little information has been coming in which fills the gaps then known to exist in our knowledge of the order. It is now possible to review more understandingly the relations of the dentition of the different groups. It would seem at first sight as if the dentition of *Lepeta* and *Lepetella* differed very widely, but more reflection diminishes the apparent divergencies.

It may be suggested that in *Lepeta ceca* the large rhachidian tooth really represents a consolidation of the six laterals characteristic of *Acmæa*, which is supported by the fact that G. O. Sars\* figures the lateral cusps of the rhachidian tooth in *Pilidium fulrum* as accessory rather than inherent parts of that tooth, a view (I find on reference to them) supported in part by my own original drawings, and a condition which, though not universal nor necessary, may yet be characteristic of some stages of the development of the individual or of the radula; or perhaps of some individuals merely, while in others the consolidation goes so far that the sutures (as in the bony structures of higher animals) are obliterated. In that case the rhachidian tooth of *Lepetella* would represent the consolidation of the two inner laterals merely, if the number six be taken as typical, which, from its universality elsewhere in the order, we may reasonably assume to be the case. This is the typical number in the *Tanioglossa* to which (as Professor Verrill indicates in his description) the radula of *Lepetella* is in some respects analogous; though the *Tanioglossa* have no uncini. In the same way, as has before

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\* Moll. Reg. Arct. Norveg. tab. II, fig. 12.



been pointed out, the single large dentate laterals of *Pectinodonta* may represent, in the other division of the order, each a consolidation of the three typical laterals of *Acmaea*.

The name *Onychoglossa* has been used by G. O. Sars (1878) to denominate the same group and as indicative of the same characters as those possessed by the *Docoglossa* (Troschel, 1861), as revised by me eight years previously. I do not see any especial gain which might result to science from substituting the newer for the older name.

The relations of the groups may be expressed somewhat as follows :

## Order DOCOGLOSSA.

Shell wholly external, dish-shaped, with apex anteriorly directed; animal with two short tentacles, a non-extensible muzzle; branchiæ external or none; renal and anal apertures situated above the neck, between body and mantle edge; no copulatory or external genital organs; mouth provided with a horny jaw and long radula with peculiar teeth; dental formula not exceeding  $\frac{1}{3(3.3)3}$ ; metamorphosis of the embryo taking place in the egg, which is fertilized in the ovary.

### Suborder ABRANCHIATA.

Animal without external branchiæ. Embryonic shell spiral.

#### Family LEPETIDÆ.

Subfamily *Lepetinae*. Without eyes; with a margined muzzle extended into (on each side) a tentacular process. Uncini erect. Dental formula  $\frac{1}{2(0.0)2} \left( ? = \frac{0}{2(3+3)2} \right)$ .

*Lepeta* Gray { *Lepeta* s. s. (+ *Pilidium* Forbes non Middendorf).  
*Cryptobranchia* Middendorf.

Subfamily *Lepetellinae*. With eyes; other soft parts as in *Lepeta*. Uncinus scale-like. Dental formula  $\frac{1}{1(2.2)1} \left( ? = \frac{0}{1(3+3)1} \right)$ .

*Lepetella* Verrill.

### Suborder PROTEOBRANCHIATA.

Animal with external branchiæ. Embryonic shell conical.

#### Family ACMÆIDÆ.

With a plumose cervical branchia; with or without a branchial cord; muzzle frilled; no rhachidian tooth.

A. Without a cordon.

A. Muzzle with lappets.

a. Blind.

*Pectinodonta* Dall.  $\frac{0}{0 \overline{(1 \cdot 1)} 0} \left( ? = \frac{0}{0 \overline{(3 \cdot 3)} 0} \right)$ .

b. With eyes.

*Scutellina* Gray. Typical species not yet examined.

*Aemava* Esch.  $\frac{0}{0 \overline{(3 \cdot 3)} 0}$ .

B. Without muzzle lappets.

*Collisella*  $\left\{ \begin{array}{l} \textit{Collisella} \text{ Dall, s. s. } \frac{0}{1 \overline{(2-1 \cdot 1-2)} 1} \\ \textit{Collisellina} \text{ Dall. } \frac{0}{2 \overline{(2-1 \cdot 1-2)} 2} \end{array} \right.$

B. With an interrupted cordon; no lappets.

*Lottia* (Gray) Cpr.  $\frac{0}{1 \overline{(2-1 \cdot 1-2)} 1}$ .

C. With complete cordon; no lappets.

*Scurria* Gray (not Cpr.).  $\frac{0}{1 \overline{(2-1 \cdot 1-2)} 1}$ .

# Family PATELLIDÆ.

Without a cervical branchia, but with a more or less complete cordon; muzzle papillose, not frilled, margined, or with lappets.

A. Branchial cordon complete.

a. With rhachidian tooth; branchial lamellæ arborescent, produced; sides of foot smooth. *Ancistromesus*.

*Ancistromesus* Dall.  $\frac{1}{3 \overline{(1-2 \cdot 2-1)} 3}$ .

b. Without rhachidian tooth; branchial lamellæ short, linguiform. *Patella*.

*Patella* Linné. Foot smooth, branchial lamellæ subequal all around.

$\frac{0}{3 \overline{(1-2 \cdot 2-1)} 3}$

*Patinella* Dall. Foot with a scalloped frill interrupted only in front;  
gills as in *Patella*. 
$$\frac{0}{3 (2-1 \cdot 1-2) 3'}$$

*Nacella* Schumacher. Foot frilled; gills very small in front; shell peculiar;  
lateral teeth all bidentate. 
$$\frac{0}{3 (2-1 \cdot 1-2) 3'}$$

B. Branchial cordon interrupted in front.

a. Sides of foot smooth. *Helcion*.

*Helcion* Montfort. Third laterals posterior, bidentate. 
$$\frac{0}{3 (1-2 \cdot 2-1) 3'}$$

*Helcioniscus* Dall. First laterals anterior. 
$$\frac{0}{3 (2-1 \cdot 1-2) 3'}$$

*Patina* Gray. Third laterals posterior, denticulate; shell peculiar.  
$$\frac{0}{3 (1-2 \cdot 2-1) 3'}$$

\* \* \* \* \*

*Metoptoma* Phillips. Posterior edge emarginate or waved.

Fossil in Carboniferous of Great Britain.

JANUARY 22, 1882.

ON TWO RECENT ADDITIONS TO THE NORTH AMERICAN BIRD-  
FAUNA, BY L. BELDING.

By ROBERT RIDGWAY.

1. *Motacilla ocularis*, Swinhoe. (Ibis, 1860, p. 55).

This species, which is the common East-Asiatic species, has been taken at La Paz, Lower California, by Mr. Belding, who secured a single adult specimen in winter plumage, on the 9th of January, 1882. It was undoubtedly a straggler, but it seems incredible that it could have found its way there across the broad expanse of the Pacific Ocean. On the other hand, it is difficult to conceive by what other means it could have reached a locality so far from its natural habitat, not being known from any part of the Pacific coast of North America, even in Alaska, although specimens have been obtained at Plover Bay, Siberia. In eastern Asia it occurs in winter as far south as Amoy, where it was first discovered by Mr. Swinhoe.

This species much resembles *M. alba* of Europe, having like it a gray back, but differing in having a large white patch covering both rows of wing-coverts, and in having a distinct post-ocular streak of black; running into the black of the occiput.

2. *Dendroæca vieillotii bryanti*, Ridgway.

(*Dendroica vieillotii* var. *bryanti* RIDGW. Am. Nat., vii, 1873, p. 606; B. B. & R., Hist. N. Am. B., i, 1874, p. 218.—*Dendroica vieillotii* SALVIN & GODMAN, Biol. Centr.-Am. Aves, i, 1879, 125, part.)

This species, described originally from Yucatan, Honduras, and Mazatlan, was found to be quite common at La Paz, in January, 1882, by

Mr. Belding. He sends two specimens, an adult male and female, which agree closely with Mazatlan examples. These western specimens all differ appreciably from eastern ones (from Yucatan and Honduras) in the darker shade of chestnut on the head and in some other less important characters, but until I have seen more specimens I do not venture to separate them.

The group to which this species belongs is an exceedingly difficult one on account of the great amount of variation with locality. A recent examination of a large series of specimens from various localities strongly suggests the probability of the existence in Middle America and the West Indies of but a single species of "Golden Warbler" besides *D. aestiva*, but this broken up into numerous local races more or less distinct from one another. According to this view, *D. petechia*, *D. capitalis*, and other West Indian races, *D. aureola*, of the Galapagos, *D. vieilloti*, and the present bird would all represent merely local variations of a single species, the difference being appreciable chiefly, if not only, in fully adult males, and consisting in the varying amount of rufous on the head and under parts. So far as the material in the National Museum collection is concerned, the distinctions between the present bird and the true *D. vieilloti*, pointed out in the descriptions above cited, hold good, and I must therefore, for the present at least, beg to dissent from the opinion of Messrs. Salvin and Godman (in Biol. Centr.-Am. Aves, i, p. 125) that *D. bryanti* cannot be separated from *D. vieilloti*.

SMITHSONIAN INSTITUTION, March 10, 1882.

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**THE TAXONOMIC RELATIONS AND GEOGRAPHICAL DISTRIBUTION OF THE MEMBERS OF THE SWORD-FISH FAMILY, XIPHIIDÆ.**

**By G. BROWN GOODE.**

The following essay toward a reformulation of the characters by which the members of the sword-fish family are classified is the outcome of a systematic study of this group of fishes, a detailed statement of which, together with an account of the sword-fisheries of the world, are given in full in a forthcoming report of the United States Fish Commission. The views of the writer having been somewhat modified since reading the proof-sheets of the report just referred to, the portion relating to the classification of the group has been rearranged and is here presented. The views of Dr. Lütken, of the Zoological Museum, Copenhagen, as expressed in his recent work entitled "Spolia Atlantica", have received a careful consideration in the preparation of these notes, and have, to a considerable extent, been adopted.

As Dr. Lütken has pointed out, the genus *Xiphias*, to which the common sword-fish belongs, cannot, as has hitherto been customary, be regarded as the central type of the family, but must be considered an

aberrant or divergent type; the round-billed species, provided with ventral fins, especially those of the genus *Histiophorus*, being the most typical and representative of the group.\*

Representatives of all the genera of the sword-fish family occurring in the waters of the United States the writer has had opportunities of studying and formulating by means comparison, certain structural characters never before expressed.

## DESCRIPTION OF THE FAMILY XIPHIIDÆ.

### Family XIPHIIDÆ, Agassiz.

*Xiphioides*, AGASSIZ, Recherches sur les Poissons Fossiles, v, 1843, p. 89.—BLEEKER, Enum. Sp. Pisc. 1859, p. 62.

*Xiphiida*, GÜNTHER, Catalogue of the Fishes in the British Museum, ii, 1860, p. 511; Fische des Südsee, i, 1873-5, p. 105; Study of Fishes, 1880, p. 431.—GILL, Arrangement of the Families of Fishes, 1872, p. 8 (name only).—DAY, Fishes of India, i, 1876, p. 198.

### Diagnosis of family.

Scombroïd fishes, with elongate, compressed bodies, covered with elongate scale-like scutes (*Tetrapturinae*) or naked (*Xiphiinae*). Pre-maxillaries with nasal and vomerine bones produced in a long spear-like snout, immovably articulated with the prenasal and maxillary. Teeth rudimentary (*Tetrapturinae*) or absent (*Xiphiinae*). Nasal bone cellular at its base. Ventrals rudimentary (*Tetrapturinae*), or absent (*Xiphiinae*). A single dorsal, extending nearly the whole length of the body in young, persistent (*Histiophorus*) or subpersistent, divided in middle with age (*Tetrapturus*), or becoming with age subdivided into two short dorsals (*Xiphiinae*). A similar rudimentation of anal fin in both subfamilies. Preopercular spine present in young (*Xiphiinae*), or parietal and preopercular spines (*Tetrapturinae*), disappearing with age. Seven branchiostegals. Pseudo-branchiæ present. Branchiæ cancellated or reticulated. Air-bladder present, cellulated (*Tetrapturus* and *Histiophorus* (?)), or simple (*Xiphiinae*). Intestine short, not sinuous (*Tetrapturinae*), or long, sinuous (*Xiphiinae*). Gall-bladder free, hanging at some distance from the liver. Articular processes developed from the parapophyses.

### Synopsis of subfamilies.

Ventrals present: skin with scutes: snout rounded: caudal keels double.

TETRAPTURINÆ, Gill.

Ventrals absent: skin scaleless: snout flat: caudal keel single. . . XIPHIINÆ, Swainson.

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\* 1875, LÜTKEN, CHR.

Om rundnæbides Sæverdfiske, særligt om *Histiophorus orientalis*, Schl. < Vidensk. Meddel. Naturhist. Foren. Kjöbenhavn, 1875, pp. 1-21 + 1-5.



DESCRIPTIONS OF THE SUBFAMILY TETRAPTURINÆ AND THE GENERA  
TETRAPTURUS AND HISTIOPHORUS.

Subfamily TETRAPTURINÆ, Gill.

*Tetrapturinae*, Gill, in Rep. U. S. F. C. i, 1873, p. 787; Cat. Fish. E. Coast N. A. 1873, p. 9 (name only; no description).

*Diagnosis of subfamily.*

Xiphiid fishes, with bodies much compressed, covered with elongate, scale-like scutes. Sword somewhat flattened, but rounded at edges, spear-like. Tooth-like granulations upon the jaws. Pelvic arch present. Ventrals reduced to a single ray. Dorsal fin single (*Histiophorus*) or in two portions, but little remote, separated by aborted section (*Tetrapturus*). Preopercular spine absent (but probably present in young). Two keels upon each side of caudal peduncle. Ultimate dorsal and anal rays suctorial. Air-bladder very large, sacculated, consisting of numerous separate divisions. Intestine short, straight. Two genera, *Histiophorus* and *Tetrapturus*.

*Synopsis of genera.*

Dorsal fin single, high, sail-like: ventral rays two or three.... *Histiophorus*, Lacépède.  
Dorsal fin double, *Xiphias*-like: ventral rays one ..... *Tetrapturus*, Rafinesque.

Genus *Tetrapturus* Rafinesque.

*Tetrapturus*, RAFINESQUE, Caratteri, etc., 1810, p. 54, pl. 1, fig. 1.

*Tetrapterus*, AGASSIZ, Poiss. Foss. v, 1843.

*Diagnosis of genus.*

Xiphiid, tetrapturine fishes, with body much compressed. Two dorsal and two anal fins in adult state; single dorsal and anal in immature ages. Tooth-like asperities on palatines and lower jaw. Body covered with cultriform scale-like scutes, under epidermis. Dorsal rays much more numerous than in *Xiphias*, less so than in *Histiophorus*. Ventrals rudimentary, consisting of one pair of very elongate, flattened rays. Vertebrae 25 (*T. belone*). Pyloric caeca very numerous. Intestine short, nearly straight.

*Habitat*.—Mediterranean, tropical and subtropical Atlantic.

1. *Tetrapturus imperator* (Schneider), Goode.

*Xiphias imperator*, SCHNEIDER, Bloch's Syst. Ichth. 1801, p. 93, pl. xxi (poor figure), founded on Duhamel, iii, p. 333, pl. xxvi, fig. 2.

*Tetrapturus belone*, RAFINESQUE, Caratteri Animali e piante della Sicilia, 1810, p. 54, pl. i, fig. 1.—CUVIER, Règne Animal, 2d ed. 1829, ii, p. 201.—CUVIER & VALENCIENNES, Hist. Nat. Poiss. viii, 1831, p. 280, pls. cccxxvii (skeleton), cccxxviii (adult fish).—BONAPARTE, Catalogo Metodico, 1846, p. 80.

*Tetrapterus belone*, AGASSIZ, Poissons Fossiles, 1843, v, p. 89, tab. E. (fine figure of skeleton).

*Tetrapterurus belone*, BONAPARTE.

*Histiophorus belone*, GÜNTHER, Cat. Fish Brit. Mus. ii, 1860, p. 513.

*Skeponopodus typus*, NARDO, Isis, 1833, Heft iv, p. 417 (Adriatic).

This species appears to be limited to the waters of the Mediterranean. It was not noticed by Linnæus, or indeed by any of the binomial writers before Schneider. In his posthumous edition of the writings of Bloch, the latter has made reference to a figure and description in Duhamel, and has given to a fish, which he figures in plate xxi of this work, the name *Xiphias imperator*. This name was rejected by Cuvier (Règne Animal, l. c.), and has not been recognized by later writers. It seems to me, however, that Schneider has, perhaps unintentionally, yet quite intelligibly, expressed the principal differential characters of *Tetrapturus*. By "dorso scabro" he covers the question of the scales; by "carina caudali nulla" he refers to the absence of the single caudal carina of *Xiphias*, while by figure and by implication in his description he admits the presence of ventral fins. His figure, though bad, is as good as most of the old figures of *Xiphias*—that of Lacépède for example.

*T. imperator* is said to attain the length of five or six feet, and the weight of 150 pounds. It has been taken in the Straits of Messina with the harpoon, but according to Rafinesque is very rarely seen on the coasts of Sicily, and then only in autumn, when it is following the dolphin and flying-fish, upon which it feeds. It is ordinarily seen in pairs, male and female together, and they are taken often in the nets together. Its flesh is white but not particularly well flavored. At Messina it is called "*Aguglia imperiale*" (Cuvier & Valenciennes, l. c.).

## 2. *Tetrapturus indicus*, Cuvier & Valenciennes.

*Tetrapturus indicus*, CUV. & VAL. Hist. Nat. Poiss. viii, 1831, p. 286 (on figure belonging to Sir Joseph Banks).

A species founded on a figure of a specimen obtained in Sumatra communicated by Sir Joseph Banks to Broussonet, who refers to it at the end of his "Memoire sur le Volier".\*

The description is worthless. It is stated by Cuvier and Valenciennes that this fish had been supposed to be the male of *Histiophorus gladius*, but that it is much more nearly related to *Tetrapturus* of the Mediterranean, though with a longer beak.

The notes accompanying the figure state that it attains the length of nine feet and the weight of 200 pounds, and was known to the Malays by the name "*Joo-hoo*".

Günther regards it as perhaps synonymous with *T. Herschelii*, Gray.†

## 3. *Tetrapturus Herschelii*, Gray.

*Tetrapturus Herschelii*, GRAY, Ann. Nat. Hist. i, 1838, p. 313, pl. x.—LÜTKEN, ll. c.  
*Histiophorus Herschelii*, GÜNTHER, l. c.

This species was described from a specimen eleven feet long obtained at Table Bay, Cape of Good Hope, in 1837. The description is repro-

\* Hist. de l'Acad. des Sciences, Paris, 1786, pp. 450-455.

† Günther, l. c. p. 513, sub. *Histiophorus Herschelii*.

duced in the appendix, and the plate is also here presented. The type of *T. Herschelii* is in the British Museum. The United States National Museum has some fine skins, apparently of this species, brought from Mauritius by Col. Nicholas Pike, United States consul. There is no reason to doubt that this species may be the same with *T. indicus*, Cuv. & Val., just described, there being little probability that there are two species in waters so close as those of Sumatra and the Cape of Good Hope.

4. *Tetrapturus Georgii*, Lowe.

*Tetrapturus Georgii*, LOWE, Proc. Zool. Soc. viii, 1840, p. 33: Trans. Zool. Soc. iii, 1849, p. 3 (reprint of first).—GÜNTHER, op. cit., p. 512, foot-note.—LÜTKEN, ll. c.

This species known at Madeira as "*Peito*", was described by Lowe thus briefly: "I am enabled to state that it forms a new and very distinct species of *Tetrapturus*, Raf., differing from *T. belone* Raf., as described by MM. Cuvier and Valenciennes, especially in having the pectoral fins proportionately twice as long, and the body clothed with large scales of a peculiar shape and character."

Lütken believes it to be identical with the two species of the Indian Ocean just discussed, as well as with the two Cuban species. It should surely be carefully compared with the latter.

5. *Tetrapturus albidus*, Poey.

*Tetrapturus albidus*, POEY, Mem. Hist. Nat. Cuba, ii, 1858, p. 237, pl. xv, fig. 1; pl. xvi, figs. 2-13; pl. xvii, figs. 1, 5, 6-9, 10-11, 26: Ib. p. 258: Rep. Fis. Nat. Cuba, ii, 1863, p. 380.—GILL, Cat. Fish E. Coast N. A. 1873, p. 24.—LÜTKEN, ll. c.

6. *Tetrapturus amplus*, Poey.

*Tetrapturus amplus*, POEY, op. cit. p. 243, pl. xv, fig. 2; pl. xvi, figs. 12-25; Rep. Fis. Nat. Cuba, ii, 1863, p. 380.—LÜTKEN, ll. c.

These two species are described by Poey from Cuba, and one of them, *T. albidus*, is not uncommon on the Atlantic coast of the United States. Lütken is disposed to consider them both identical with the *T. indicus* type, and it seems to me that there is as much reason for this procedure as for merging the Sail-fishes of the Atlantic and Indian Oceans, as has been persistently done by all writers on ichthyology.

7. *Tetrapturus brevirostris* (Günther & Playfair), Lütken.

"*Histiophorus brevirostris*, GÜNTHER & PLAYFAIR, Fishes of Zanzibar, 1866, pp. 53, 145, figure."—DAY, Fishes of India, 1876, p. 199, pl. xvii, fig. 3.

*Tetrapturus brevirostris*, LÜTKEN, ll. c.

*Histiophorus*, KNOX, Trans. New Zealand Institute, ii, 1870, pp. 13-16, fig. 1.

This species, the habitat of which is given by Day as "? East coast of Africa, seas of India, perhaps New Zealand", is referred by Lütken to the same species with *T. indicus* and *T. Herschelii*. Day considers it closely allied to *Tetrapturus Lessonii*, Canestrini.

8. *Tetrapturus Lessonii*, Canestrini.

*Tetrapterus Lessonii*, CANESTRINI, Arch. Zool. 1861, i, p. 259, pl. vii.—LÜTKEN, ll. c.—DAY, ll. c.

This species, described by Canestrini from the Mediterranean, is referred by Lütken to the general cosmopolitan type, of which *T. indicus* and *T. Herschelii* are the representatives.

DESCRIPTIVE NOTES ON THE AMERICAN SPEAR-FISH, *TETRAPTURUS ALBIDUS*.

The following description was drawn up from a fine specimen of the spear-fish taken at Block Island, R. I., in 1875:

A male fish of 2,150<sup>mm</sup> (84.646 inches), ordinary size.

Body elongated, nape elevated, bringing the greatest height over the operculum (10.27 inches). At the point of the pectoral the height is nine-elevenths of that at the operculum (8.4 inches), and is contained about 10 times in total length.

The head from extremity of lower jaw is contained in the total length 4 times (21.161 inches). The eye is situated midway between operculum margin and tip of lower jaw. The length of the bill beyond lower jaw equals greatest height of head. Palatines with a narrow band of rough dentifications. Asperities on the lower jaw. Bill extremely hard, especially at its extremity; its form is depressed, its edges rounded, its height greater than half its width. Preoperculum situated far back; commences midway between the eye and the opercular margin. The other opercular bones are not visible in fresh specimen.

Lateral line marked by a series of minute apertures on a continuous band, connected at the top of operculum; continues backward in a straight line for a short distance, then bends downward and reaches the middle line of the body at the point of the pectoral. Scales bony, linear, absent from the head, except on the cheeks. Those of lateral line not pierced. All the scales covered by epidermis.

Br. 7; D. 3, 39-6; A. 2, 13-6; P. 19; V. 1, 4; C. 12.

All the rays osseous, not articulated; those indicated as osseous are only distinguished from the others by their terminating in a point, which is not free. The others are flattened towards the extremity and frayed at the ends. The two first anal and three first dorsal rays are ossified to each other and upon the ray behind them, so that they appear to sight and touch as if only a single ray. Dissection shows that the first dorsal is very small (20<sup>mm</sup>); second, 2½ times as high (50<sup>mm</sup>); third, 115<sup>mm</sup>; the fourth twice as long. The same in anal. First, 30<sup>mm</sup>; second, 70<sup>mm</sup>; third like fourth dorsal in form. These fins are for the most part hidden in the furrows, and their last rays are extremely short, so that it is necessary to lay them bare by dissection.

First ray of second dorsal and second anal flat and striated; these fins are crenated. The fourth of first dorsal and third of first anal touch the summits of the fins, which are slightly rounded.



First ray of pectoral very strong and prolonged to the extremity; 8 last short, forming the subbrachial dilation.

Ventral appears at first sight a single ray, but dissection shows 5, the 3 first anchylosed. They are received in a furrow, which extends to the anus.

Caudal stiff; bifurcation making angle of  $72^{\circ}$  from middle of the two caudal crests to the point of the lobes, and, neglecting points,  $80^{\circ}$ .

Origin of first dorsal above preopercle, its height surpassing by one-sixth the height of the body beneath it.

Pectoral one eighth length of body from point of lower jaw.

First anal lower than dorsal.

The two others are small and opposite. The second dorsal a little farther back, a little higher, and a little more "échanerée".

*Color*.—Pronounced deep blue above, a little lighter on the flanks, passing into white below. Fins intense blue; second anal and outside of pectoral lighter. First dorsal with rounded spots, more intense, of same color. Iris clear blue; cornea blackish.

Four gills of double structure and an accessory, reticulated as in *Xiphias*.

Pylorus attached high up and has great longitudinal folds; also the duodenum, which is swollen and receives, by two openings, the secretions of the compact and glandulous mass which covers it.

Intestine slender, with two short convolutions, embracing in its last the spleen.

Swim-bladder cellulous, showing great puffs, which extend far behind the anus.

A second specimen, the measurements of which are given below (B), suggested the following notes:

Top of head and body, upper lobe of caudal fin, and caudal cartilage bluish black. Belly and throat white. Cheeks and opercular blackish, covered with a pearly sheen. The black hue of the back shades into the white of the belly through an insensible gradation of lines, the most prominent of which are rich purplish brown and light smoky gray. The belly and the sides are pearly up to the lateral line. The boundary between the colors of the back and the belly is indicated by an indistinct line, which may be traced from the base of the rostrum over the top of the orbit and the operculum, then descending across the lateral line at a point above the middle of the pectoral fin; it then rises in the arc of a circle above the lateral line, which it meets again at the tail, the distance between them being the greatest over the anal fin. The lower lobe of the caudal is blackish, with a pearly sheen. The ventrals and second dorsal fins are blue-black. The anterior rays of the first dorsal are also blue-black, the membrane being light bluish purple, irregularly spotted with circular dots from one-quarter to one-half an inch in diameter. The first anal is deep bluish purple at its extremity, but on its basal half bright pearly white. The inner surface of the pectoral is



bluish purple, brightest in the axil; its outer surface is blackish, though completely covered with a pearly sheen.

The ventrals, first dorsal, and first anal, when not erected, are completely hidden in grooves. The second dorsal and second anal are not so hidden. The pectorals are flat, closely clinging to the sides when not in motion; their base received into a depression in the side of the fish.

The lanceolate scales may be seen through the epidermis, giving a reticulated appearance to sides of the fish.

The second dorsal and the second anal have broad, flattened, ultimate rays, which adhere closely to the body of the fish.

*Measurements.*

Current number of specimen .....	A.	B.
Locality .....	New Bedford, Mass., July, 25, 1875.	Wood's Holl, Mass., 1875.
	Inches.	Inches.
Extreme length .....	80.00	89.00*
Length to end of middle caudal rays.....	70.50	81.00
Body:		
Greatest height.....	9.00	{ 11.50†
Height at ventrals .....	9.00	{ 9.00‡
Head:		
Greatest length.....	27.00	28.75
Greatest width.....	5.00	.....
Width of interorbital area .....	4.25	.....
Length of snout .....	17.50	19.50
Length of bill .....	.....	12.25§
Length of operculum .....	3.00	.....
Length of upper jaw to commissure of jaws .....	.....	22.75
Length of lower jaw to commissure of jaws .....	.....	10.50
Distance from snout to orbit .....	17.50	.....
Diameter of orbit.....	2.00	2.00
Dorsal:		
Distance from snout .....	26.00	28.00
Length of base .....	40.00	37.00
Greatest height.....	.....	12.25
Height at first spine .....	11.50	.....
Height at second spine.....	11.75	.....
Height at third spine .....	11.00	.....
Height at fourth spine .....	10.75	.....
Height at fifth spine .....	10.50	.....
Height at sixth spine .....	9.00	.....
Height at seventh spine.....	7.25	.....
Height at eighth spine .....	5.00	.....
Height at ninth spine .....	5.75	.....
Height at tenth spine .....	4.50	.....
Height at eleventh spine.....	3.50	.....
Height at twelfth spine .....	3.50	.....
Height at thirteenth spine .....	3.00	.....
Height at fourteenth spine.....	2.50	.....
Anat:		
Distance from snout .....	49.00	54.00
Length of base.....	15.00	10.25
Height at first spine .....	7.50	.....
Height at second spine.....	7.50	.....
Height at third spine .....	6.75	.....
Height at fourth spine .....	6.00	.....
Height at fifth spine .....	5.50	.....
Height at sixth spine .....	2.75	.....
Height at seventh spine .....	.80	.....
Height at eighth spine .....	.50	.....
Height at ninth spine .....	.35	.....
Height at tenth spine .....	.25	.....
Height at eleventh spine .....	.10	.....
Height of fin above sheath.....	.....	7.25

\*To vertical from upper caudal lobe.

†Over vent.

‡At origin of dorsal.

§Beyond tip of lower jaw.

|| "Length of anal groove."

## Measurements—Continued.

Current number of specimen.....	A.	B.
Locality .....	New Bedford, Mass., July 25, 1875.	Wood's Holl, Mass., 1875.
	Inches.	Inches.
Caudal:		
Length of middle rays .....	2.60	
Length of external rays .....	16.00	
Distance between lobe tips .....		24.25
Pectoral:		
Distance from snout .....	28.50	29.00
Length .....	14.75	13.50
Ventral:		
Distance from snout .....		30.50
Length of groove from base of ventrals to vent. ....	10.00	18.50
Dorsal .....	40+6	39+5
Anal .....	11+6	14+6
Caudal .....	6+4+4+5	
Pectoral .....	18	20
Ventral .....	1	1
Weight, dressed (pounds) .....	55½	
Number of vertebræ:		
Dorsal .....	11	
Caudo-lumbar .....	13	

Genus *Histiophorus* Lacépède.

< *Istiophorus*, LACÉPÈDE, Hist. Nat. Poiss. iii, 1803, p. 374.

< *Histiophorus*, CUVIER & VALENCIENNES, Hist. Nat. Poiss. viii, 1833, 291.

< *Histiophorus*, GÜNTHER, Cat. Fish. Brit. Mus. ii, 1860, p. 512.

*Notistium*, HERMANN, Observ. Zool. 1804, p. 305.

## Diagnosis of genus.

Xiphiid, tetrapturine fishes, with body slender and very much compressed. Dorsal single (though the last few rays are nearly abortive), retaining the character of extreme youth, which is lost in *Xiphias* and *Tetrapturus*, and very lofty. Vertebræ 24 (*H. indicus*). Anal fin double. Numerous tooth-like asperities on the jaws. Body covered with elongate scales. Dorsal rays, being unaborted, very numerous. Ventrals consisting each of two or three elongate rays. Intestine short, nearly straight, with two foldings. A single species in the United States, *Histiophorus americanus*, Cuvier.

9. *Histiophorus gladius* (Broussonet), Lacépède.

*Scomber gladius*, BROUSSONET, Mem. Acad. Sci. 1786, p. 454, pl. x.

< *Scomber gladius*, BLOCH, Ichthyology, pl. cccxlv: Hist. Nat. Poiss.

< *Istiophorus gladius*, LACÉPÈDE, "iii, pp. 374-5", 2d ed. 8°, 1819, p. 542.

*Histiophorus gladius*, GÜNTHER, l. c. p. 513.—GILL, ll. c.

< *Xiphias relifer*, SCHNEIDER, l. c. p. 93.

*Histiophorus indicus*, CUV. & VAL. l. c. p. 293, pl. cccxx.

This species, described first by Broussonet from specimens brought from the Indies—"la mer des Indes"—by Banks, has usually been considered, perhaps rightly, by later authors to be identical with the American form.

10. *Histiophorus americanus*, Cuvier & Valenciennes.*Guebucu brasiliensis*, MARCGRAVE, Hist. Brasil. 1648.<*Scomber gladius*, BLOCH, l. c.<*Histiophorus gladius*, authors.—*Histiophorus americanus*, CUV. & VAL. l. c. p. 303.*Skeponopodus guebucu*, NARDO, Isis, Heft iv, p. 416.

The history of this species is given below. Lütken follows the general lead in identifying this with *H. gladius*.

11. *Histiophorus orientalis*, Temminck & Schlegel.*Histiophorus orientalis*, TEMM. & SCHLEG. Fauna Japonica, Pisces, 1842, p. 103, pl. iv (specimen 7 feet long, from Japan).—GÜNTHER, op. cit. p. 514.—LÜTKEN, Vid. Med. Nat. Foren. 1875, p. 1, pl. i (specimen 7 feet  $1\frac{1}{4}$  inches long, from Singapore).

In his first paper on the Sword-fishes Lütken, though doubtful, seemed inclined to consider this a distinct species. In "*Spolia Atlantica*" he speaks of two species of *Histiophorus*, but I am unable to decide whether it is this or *H. gracilirostris* which he regards as well separated from *H. gladius*. Speaking of the occurrence of this fish in the seas of Japan, Temminck and Schlegel remark that its Japanese name is "Herivo"; that it is occasionally taken in autumn on the southwest coast of Japan during the progress of the tunny fishery, and that its flesh is much esteemed.

12. *Histiophorus immaculatus*, Rüppell.*Histiophorus immaculatus*, RÜPPELL, Proc. Zool. Soc. iii, 1835, p. 187 (abstract):

Trans. Zool. Soc. ii, p. 71, pl. xv: "N. W. Fische, p. 47, taf. xi, fig. 3".—

GÜNTHER, l. c.—LÜTKEN, ll. c.—DAY, Fish. India, 1876, p. 199.

Rüppell's specimen came from Djetta on the Red Sea, where the Arabs caught it in a net. He regards it as rare because the Arabs had no common name for it. The specimen is preserved in the museum at Frankfort, and, if I rightly understand Dr. Lütken, is 18 inches long. Dr. Lütken unhesitatingly pronounces it the young of *H. gladius* or *H. orientalis*, considering it to be slightly older than the one figured by Cuvier and Valenciennes as *H. pulchellus*.

Day mentions a specimen of this species in the Madras Museum 5 feet 9 inches long. This, to be consistent with Lütken's theory, must be regarded as a specimen in which the colors have disappeared.

13. *Histiophorus pulchellus*, Cuvier & Valenciennes.*Histiophorus pulchellus*, CUV. & VAL. Hist. Nat. Poiss. viii, 1831, p. 305, pl. ccxx.—GÜNTHER, op. cit. p. 514.—LÜTKEN, ll. c.

Cuvier and Valenciennes described under this name a specimen 4 inches long taken in the Eastern Atlantic, north of the Cape of Good Hope, probably somewhere on the west coast of Africa, by M. Raynaud. There were said to have been a great many more of the same size in the place where it was taken.

Lütken regards it as the young of *Histiophorus gladius*. He uses it to

complete the series of development between the small specimens described by Günther and the adult forms.

14. *Histiophorus gracilirostris*, Cuv. & Val.

*Histiophorus gracilirostris*, CUV. & VAL. l. c. p. 308 (description of a snout from Seychelles).—LÜTKEN, ll. c.

Cuvier and Valenciennes had in their possession, and described, a beak or spear the breadth of which was contained 25 to 26 times in its length, and the sides of which were more rounded than in the other specimens accessible to them. This was from Seychelles. Lütken is inclined to admit this provisionally as a distinct species. Günther, on the other hand, ignores *H. gracilirostris*, but regards *H. ancipitirostris* as a possibly existing form.

15. *Histiophorus ancipitirostris*, Cuv. & Val.

*Histiophorus ancipitirostris*, CUV. & VAL. op. cit. p. 309.—GÜNTHER, op. cit. p. 512, note.

A snout (locality unknown), having a flattened surface, its width contained 19 or 20 times in its length, was the basis of Cuvier's description. Probably a species of *Tetrapturus*.

16. *Makaira nigricans*, Lacép.

*Makaira nigricans*, LACÉPÈDE, Hist. Nat. Poiss. "iv, pp. 688, 689, pl. xiii, fig. 3".—CUV. & VAL. Hist. Nat. Poiss. viii, p. 287.

*Xiphias makaira*, SHAW, Zool. iv, Fish. p. 104.

*Machera velifera*, CUVIER, Nouv. Ann. Mus. Hist. Nat. 1832, p. 43, pl. 3.—LÜTKEN.

*Xiphias velifer*, GÜNTHER, op. cit. p. 512.

This species is undoubtedly mythical. Lütken and others have pointed out the error of arranging it, as Günther has done, with *Xiphias*. He suggests that in the specimens described by Lacépède the ventral rays were hidden in the ventral furrow, and unperceived. In this case, he remarks, it would be identical with *Histiophorus gracilirostris*; but, at all events, whether it has ventral fins or not, its right place is with the subfamily *Histiophorinae*.

The specimen described by Lacépède was never seen by him. It was driven ashore near Rochelle, and his sole acquaintance with it was from a drawing and description given him by M. Traversay, *sous-préfet* of that town. It seems strange that so much stress has been laid upon this description and so much discussion has been held over its true classification.

DESCRIPTIVE NOTES ON THE AMERICAN SAIL-FISH, *HISTIOPHORUS GLADIS*.

Strange as it may seem, the American species of *Histiophorus* has never been studied by an ichthyologist, and no attempt has ever been made to describe it, or to compare it carefully with the similar species

occurring in the Indian Ocean. The identity of the two has been assumed by Dr. Günther,\* but since no American specimens have ever been seen by this authority, I hesitate for the present to follow his lead.

This history of the Sail-fish in ichthyological literature is as follows:

The first allusion to the genus occurs in Piso's "*Historia Naturalis Brazilie*", printed at Amsterdam, in 1648. In this book† may be found an identifiable though rough figure of the American species, accompanied by a few lines of description, which, though good, when the fact that they were written in the seventeenth century is brought to mind, are of no value for critical comparison.

The name given to the Brazilian Sail-fish by Maregrave, the talented young German who described the fishes in the book referred to, and who afterwards sacrificed his life in exploring the unknown fields of American zoology, was *Guebucu brasiliensibus*. The use of the name *Guebucu* is interesting, since it gives a clue to the derivation of the name "Boohoo," by which this fish, and probably the Spear-fishes, are known to English-speaking sailors in the tropical Atlantic.

Sail-fishes were observed in the East Indies by Renard and Valentijn, explorers of that region from 1680 to 1720, and by other eastern voyagers. No species of the genus was, however, systematically described until 1786, when a stuffed specimen from the Indian Ocean, eight feet long, was taken to London, where it still remains in the collections of the British Museum. From this specimen M. Broussonet prepared a description, giving it the name *Scomber gladius*, rightly regarding it as a species allied to mackerel.

In 1803 Lacépède established the genus *Histiophorus* for the reception of this species.

When Cuvier and Valenciennes published the eighth volume of their *Natural History of Fishes* they ignored the name *gladius*, which had been given to the East Indian fish by Broussonet, redescribing it under

\* Catalogue of the fishes in the British Museum, ii, 1860, p. 513.

† 1648, Piso and Maregrave.

*Historia Naturalis | Brazilie, | Auspicio et Beneficio | Illustrata | Mauritii Com. Nassau | illius Provincie et Maris summi Præfecti Adornata: | In qua | Non tantum Plantæ et Animalia, sed et In- | digenarum morbi, ingenia et mores describuntur et | Iconibus quingentis illustrantur |* (Elaborate engraved title-page, upon which the preceding inscription is inserted upon a scroll, the following upon a shell:) *Lygyn Batavorum, | Apud Franciscum Hackium | et | Amstelodami, | Apud Lnd. Elzevirium 1648 | pp. (12) 122 (2) (8) 293 (7).*

#### SECOND TITLE.

*Guilielmi Pisonis, M. D. | Lugduno-Batavi, | de Medicina Braziliensi | Libri Quatuor: | I De Aëre, Aquis & Locis | II De Morbis Endemiis. | III De Venenatis & Antidotis. | IV De facultatibus Simplicium | et Georgi Maregravi de Liebstad | Misnici Germani, | Historiæ Rerum Naturalium | Brazilie, | Libri octa: | Quorum | Tres pueros agunt de plantis | Quartus de Piscibus. | Quintus de Avibus. | Sextus de Quadrupedibus & Serpentibus | Septimus de Insectis. | Octavus de Ipsa Regione, & Illius Incolis. | Cum | Appendice de Tapuyis, et Chilensibus | Ioannes de Læt, | Antwerpianus, | In ordinem digessit & Annotationes addidit, & varias ab Auctore | Omissa supplevit & illustravit.*



the name *Histiophorus indicus*. At the same time they founded another species upon the figure in Piso's Natural History of Brazil, already mentioned. This they called *Histiophorus americanus*.

In a paper printed in 1833, Dr. Nardo, of Venice, proposed the establishment of a new genus allied to *Tetrapturus* and *Xiphius*, to be called *Skeponopodus*. In this he included the fish described by Maregrave, under the name *Skeponopodus guebucu*, and also a form observed by him in the Adriatic in 1829, which he called *S. typus*. I am not aware that ichthyologists have yet learned what this may have been.\*

From the time of Maregrave until 1872 it does not appear that any zoologist had an opportunity to study a Sail-fish from America, or even from the Atlantic, yet in Günther's "Catalogue" the name *Histiophorus americanus* is discarded and the species of America is assumed to be identical with that of the Indian Ocean.†

Günther restores Lacépède's name *H. gladius* for the Indian species. Possibly, indeed probably, this name will be found to include the Sail-fish of our own coast. At present, however, it seems desirable to retain a separate name. To unite species from widely distant localities without ever having seen them, is very disastrous to a proper understanding of the problems of geographical distribution.

The materials in the National Museum consist of a skeleton and a painted plaster cast of the specimen taken near Newport, R. I., in 1872, and a drawing made of the same, while fresh, by Mr. J. H. Blake.

The occurrence of the Sail-fish is, as has been already stated, very unusual. Maregrave saw it in Brazil as early as 1648. Sagra and Poey mention that it has been seen about Cuba, and Schomburgh includes it in his Barbados list. The specimen in the United States National Museum was taken off Newport, R. I., in 1872, and given to Professor Baird by Mr. Samuel Powell, of Newport. No others were observed in our waters until March, 1878, when, according to Mr. Neyle Habersham, of Savannah, Ga., two were taken by a vessel between Savannah and Indian River, Florida, and were brought to Savannah, where they attracted much attention in the market. In 1873, according to Mr. E. G. Blackford, a specimen in a very mutilated condition was brought from Key West to New York City.

## DESCRIPTION OF THE SUBFAMILY XIPHIINÆ AND THE GENUS XIPHIAS.

### Subfamily XIPHIINÆ, Swainson.

> *Xiphiina*, SWAINSON, Nat. Hist. Fish. Amphib. &c. 1839, p. 239.

> *Xiphiini*, BONAPARTE, Cat. Metod. Pesci Europei, 1846, p. 80.

> *Xiphiina*, GILL, Canadian Naturalist, 1867, p. 250.

\* Isis, 1833, Heft iv, pp. 415-419.

† The specimens in the British Museum are catalogued as follows:

- a. Eight feet long; stuffed. Indian Ocean. Type of the species.
- b. Seven feet long; stuffed. Cape of Good Hope.
- c. Dorsal fin. N. S. Wales (?). Presented by Dr. G. Bennett.
- d. Snout; dried.

*Diagnosis of subfamily.*

Xiphiid fishes, with bodies somewhat compressed, scaleless, or in young state covered with rough granulations. Sword flattened horizontally. Teeth absent. Pectorals sublateral. Pelvic arch and ventrals absent. A keel upon each side of the caudal peduncle. Air-bladder simple. Intestine long, sinuous. A single genus, *XIPHIAS*, L.

Genus *Xiphias* Artedi.

*Xiphias*, ARTEDI, Genera Piscium, 1738, p. 29.

*Xiphias*, LINN. Syst. Nat. ed. x, 1758, p. 248; ed. xii, p. 432.

*Xiphias*, CUVIER, Règne Animal, 1817, p. 326, 1829, p. 200.

*Xiphias*, GÜNTHER, l. c.

*Diagnosis of genus.*

Xiphiine fishes, with two dorsal fins in adult condition, the continuous dorsal of the young having become rudimentary in its median portion. Preoperculum spineless in adult, the large spine of the young disappearing at an early age. Teeth absent "except upon the pharyngeal bones, which are covered with a villosity of extremely fine and minute denticles." (*Owen*.) Number of dorsal rays probably variable. Vertebrae 26 (*Steindachner*). Branchiostegals 7. Stomach siphonal. pyloric caeca very numerous. Gall-bladder large.

HABITAT.—Tropical and temperate parts of the Atlantic, Mediterranean, New Zealand, South Pacific, and South Sea.

A single species of this genus is now known, *Xiphias gladius*, L. The species recorded in GÜNTHER'S Catalogue of the Fishes in the British Museum, vol. ii, p. 512, under the name *Xiphias relifer*, if not mythical, is probably a *Histiophorus*. Lacépède's figure represents it with two caudal carinae.

17. *Xiphias gladius*, Linnaeus.

*Xiphias gladius*, LINNÆUS, Systema Naturæ, 10th ed. 1758, i, p. 248; 12th ed. 1766, i, p. 432. ("Habitat in oceano Europæ".)

BLOCH, Ichthyologie, i, 1786, pl. lxxvi, p. 23. (Habits, from statements of Chevalier Hamilton.)

GMELIN, Linn. Syst. Nat. 1788, p. 1149 (includes also under (B) the American *Histiophorus*.)

WALBAUM, Artedi, Genera Piscium, 1792, p. 207.

LACÉPÈDE, Hist. Nat. Poiss. 2d ed. 8vo. 1819, i, p. 538, fig. 2, pl. 24 (grotesque figure).

SCHNEIDER, Bloch's Systema Ichthyologie, 1801, p. 93 (mentions occurrence in Baïtie).

SHAW, Zoology, 1804.

Risso, Ichthyologie de Nice, 1830, p. 99 (obs. on habits): Hist. Nat. Europe Meridionale, 1826-7, iii, p. 208.

CUVIER, Règne Animal, 1 ed. 1817, p. 326; 2d ed. 1829, p. 200; Griffith's ed. 1834, p. 187, pl. xxvii, figs. 1, 2 (taken from CUV. & VAL. Hist. Nat. Poiss. 9, v), Supl. p. 349.

SCORESBY, in Edinburgh Phil. Journ. iii, p. 441 (vessel struck by sword fish).

- FLEMING, British Animals, p. 220, and in Brewster's Journal, ii, p. 187 (specimens taken in the Tay).
- CUVIER & VALENCIENNES, Hist. Nat. Poiss. viii, 1835, p. 235, pls. ccxxv (figure of young of 12 to 18 inches length), ccxxvi (fig. of adult).
- JENYNS, British Vertebrates, 1835, p. 364.
- YARRELL, History of British Fishes, 1st ed. 1836, p. 143 (fig. of young); 2d ed., p. 164 (fig. of young).
- RICHARDSON, Fauna Bor. Amer. 1866, pp. 78, 81. (Denies its existence in the Western Atlantic.)
- WILSON, Encyclopedia Britannica, art. Ichth. p. 184, pl. ccii.
- PARNELL, Fishes of the Firth of Forth, 1838, p. 55.
- STORER, Report on the Fishes of Massachusetts, 1839, p. 51: Memoirs American Academy of Sciences, 1846, p. 347; 1853, p. 149: Synopsis of the Fishes of North America, 1846, p. 95: History of the Fishes of Massachusetts, 1867, p. 71, pl. xiii, fig. 2.
- DEKAY, Zoology of New York, Fishes, 1842, p. 111, pl. xxvi, fig. 79.
- LOWE, Trans. Zoological Society, London, iii, 1849, p. 5.
- GUICHENOT, Exploration Scientifique de l'Algérie, Poissons, 1851, p. 60.
- GÜNTHER, Cat. Fish. Brit. Mus. ii, 1860, p. 571; Fische der Südsee, i, 1873-5, p. 105; Study of Fishes, 1880, pp. 173, 431 (cuts), and article on Ichthyology, Encyc. Britannica, vol. xii: Journ. Mus. Godeffroy, part ii, p. 170, figs.
- GILL, Cat. Fish. E. Coast N. E. 1861, p. 38; Canadian Naturalist, 1865, p. 250; Cat. Fish. E. Coast N. A. 1873, p. 24; and in Rep. U. S. C. F. i, 1873, p. 802.
- POEY, Syn. Piscium Cubensium, ii, 1863, p. 379 (*Xyphias gladius*).
- STEINDACHNER, Sitzb. Ak. Wiss. Wien. 1868, p. 396 (measurement of a Spanish specimen).
- HECTOR, Trans. New Zealand Institute, vii, 1873, p. 246 (occurring at Auckland) (*Ziphius gladius*).
- HUTTON, Trans. New Zealand, part vii, 1873, p. 211 (second occ. at Auckland).
- CHEESEMAM, Trans. New Zealand, part viii, 1875, p. 219 (*Ziphius gladius*, measurements of specimens from Shelly Bay, Auckland).
- GOODE, Cat. Fishes Bermudas, 1876, p. 45.
- GOODE & BEAN, Cat. Fish. Mass. Bay, 1879, p. 14.
- GIGLIOLI, Catalogo Esp. Internat. di Pesca, Berlin, 1880, p. 88.
- LÜTKEN, Vid. Selsk. Skr. 5te. Række, naturv. og math. Afd. iii, 6, (Spolia Atlantica), pp. 441, 592, figs. 1, 2, 3, pl. ii, fig. 10. (Notes upon the young of *Xiphius gladius* and related species.)
- Xiphius Rondeletii*, LEACH, Mem. Wernerian Nat. Hist. Society ii, 1818, p. 58.
- STEINDACHNER, Sitzb. Ak. Wiss. Wien. 1868, p. 396.
- HUTTON, Trans. New Zealand, part viii, 1873, p. 211.

# DESCRIPTIVE NOTES ON THE SWORD FISH, *XIPHIUS GLADIUS*.

My notes fail to supply the necessary data for a full description of the species, and since the fish is not likely by any one to be confounded with any other, I do not think it necessary to defer publication until this data can be supplied. I append the following note upon a small specimen, and also partial measurement table for two others, one in inches, the other in millimeters.

A specimen taken off Seacoquet, July 23, 1875. Weight 113 pounds; extremity of sword gone. One of the smallest ever seen in this region.

Dorsal fin in its median part nearly destroyed, but traces of the groove and spines remaining.

*Color*.—Above rich purplish blue, shading into whitish beneath the sides, and belly with a silvery luster. Fins bluish dark with silvery sheen, except dorsal. Top of the head rich purplish blue, the color extending upon the rostrum. Lower side of rostrum rich brownish purple. Eye deep blue. No trace of scales.

*Viscera*.—Liver greenish light brown. Stomach siphonal; pyloric ceca infinite in number; intestine spiral 10 inches long when in position, 90 when stretched out. Gall-bladder large, situated on the same line with the spleen, and at same distance from the liver, connected by a duct. Air-bladder simple, large. Spermaries large, 6 inches long. Stomach contained small fish, perhaps *Poronotus*, and jaw of *Loligo Pealii*. Fluke worms in cover of stomach and air bladder.

Table of measurements.

Current number of specimen.....	A. Seaconnet, R. I., July 23, 1875.	B. Gloucester, Mass., 1878.
Locality .....		
	Inches.	Millimeters.
Extreme length (tip of sword gone).....	91.00	.....
Length to end of middle caudal rays .....	81.50	2,040
Body:		
Greatest height.....	13.50	.....
Greatest circumference.....	35.00	.....
Least height of tail.....		80
Head:		
Greatest length.....	37.00+	.....
Length to tip of lower jaw.....	16.50	490
Greatest width.....	6.75	.....
Width of interorbital area.....	4.35	170
Length of snout.....	26.00+	.....
Length of operculum.....	5.00	150
Length of mandible.....	11.00	310
Diameter of eye.....	2.75	80
Dorsal (first):		
Distance from tip of lower jaw.....	15.50	.....
Length of base (including first and second) .....	37.00	470 (1st)
Greatest height.....	12.00	470
Dorsal (second):		
Length of base.....		30
Height at longest ray.....		75
Height at last ray.....	2.25	.....
Anal:		
Distance from snout.....	37.00	.....
Length of base.....	12.25	250
Height at longest ray.....	8.25	300
Height at last ray.....	2.25	.....
Caudal:		
Length of middle rays.....	3.50	160*
Length of external rays.....	16.50	550
Pectoral:		
Distance from tip of lower jaw.....	16.00	.....
Length.....	14.25	390
Branchiostegals.....	8	.....
Dorsal.....	20 (19), 2	.....
Anal.....	11 (X), 3	.....
Pectoral.....	20	.....
Weight (pounds).....	113	.....

\* From end of carina.

Table of measurements.

Locality .....	Portland, Me., Aug. 15.
	Millimeters.
Extreme length .....	3,930
Length to end of middle caudal rays .....	3,785
Body:	
Greatest height .....	638
Greatest width .....	470
Greatest circumference .....	1,705
Height at origin of anal .....	520
Least height of tail .....	120
Height under second dorsal .....	220
Length of caudal peduncle .....	238
Head:	
Greatest length .....	1,570
Greatest width .....	385
Width of interorbital area .....	223
Length of snout .....	1,085 (870)
Length of operculum .....	200
Length of mandible .....	435
Diameter of orbit .....	100
Dorsal ( <i>spinous</i> ):	
Distance from snout .....	1,530
Length of base .....	500
Greatest height .....	550
Dorsal ( <i>soft</i> ):	
Length of base .....	50
Distance from snout .....	3,175
Height .....	90
Distance between dorsals .....	1,208
Anal:	
Distance from snout .....	2,538
Length of base .....	350
Distance of second anal from snout .....	3,125
Height at longest ray .....	340
Caudal:	
Width at caudal torinæ .....	500
Length of external rays .....	730
Tip to tip of caudal .....	1,140
Pectoral:	
Distance from snout .....	1,598
Length .....	532
Weight, about (pounds) .....	600

Steindachner has given the following measurements of two specimens obtained by him on the coast of Spain, the largest 3 feet 7 inches in length, the smallest much younger and corresponding to the young specimen figured by Cuvier and Valenciennes in the *Histoire Naturelle des Poissons*, pl. 225.\*

Table of measurements.

	A.	B.
	Inches.	Inches.
Total length .....	43 0	24.6
Length of head .....	20.7	9.7
Length of intermaxillary from anterior margin of eyes .....		
Length of mouth-opening from point of intermaxillary to posterior end of upper jaw .....	15.6 $\frac{1}{2}$	8.0
Breadth of forehead .....	17.2	8.0
Length of under jaw .....	1.9	1.1 $\frac{1}{2}$
Height of body .....	6.0	2.3 $\frac{1}{2}$
Length of pectoral .....	4.6	3.5 $\frac{1}{2}$
Height of dorsal at first cleft rays .....	5.8	6.2
Greatest height of dorsal .....	6.2	2.1 $\frac{1}{2}$
Length of base of dorsal .....	14.4	3.4
Height of anal .....	3.4	1.11
Length of base of anal .....	4.6	

\* Sitzb. Ak. Wiss. Wien, 1868, p. 396.



The following measurements were taken by T. F. Cheeseman, esq., F. L. S., from a specimen stranded in January, 1875, at Shelly Beach, New Zealand:

	Feet.	Inches.
Total length from tip of snout to end of caudal fin .....	11	3
Length of snout from tip to center of eye .....	3	11½
Length of snout from tip to gape .....	4	1
Length of snout from tip to free edge of operculum .....	4	6
Length of snout from tip to nostrils .....	3	7
Length of lower jaw from point to gape .....	0	11
Projection of upper jaw over lower .....	3	2
Height of dorsal fin .....	1	3
From dorsal to caudal .....	4	0
Length of pectoral fins .....	1	5
Length of anal .....	0	8
Height of second dorsal .....	0	2½
From anal to caudal .....	1	8
Width across the tail .....	2	3
Girth just behind the eyes .....	2	11
Girth behind dorsal .....	4	8
Girth behind caudal .....	0	11
Diameter of eye .....	0	3

The extreme point of the snout was broken off, about three inches being wanting.\*

#### GEOGRAPHICAL RANGE OF THE SWORD-FISH FAMILY.

Although it may not seem desirable at present to accept in full the views of Dr. Lütken regarding the specific unity of the Spear-fishes and the Sail-fishes of the Atlantic and Indian Oceans, it is convenient to group the different species in the way he has suggested in discussing their geographical distribution.

THE SWORD-FISH, *Xiphias gladius*, ranges along the Atlantic coast of America from Jamaica, lat. 18° N., Cuba, and the Bermudas to Cape Breton, lat. 47°. Not seen at Greenland, Iceland, or Spitzbergen, but occurring, according to Collett, at the North Cape, lat. 71°. Abundant along the coasts of Western Europe, entering the Baltic and the Mediterranean. I can find no record of the species on the west coast of Africa south of the Cape Verdes, though Lütken, who may have access to facts unknown to me, states that they occur clear down to the Cape of Good Hope, South Atlantic in mid-ocean, west coast of South America and north to Southern California, lat. 34°, New Zealand, and in the Indian Ocean off Mauritius. Good authorities state that sperm-whales, though constantly passing Cape Horn, never round the Cape of Good Hope. Can this be true in the case of the Sword-fish?

THE SAIL-FISH, *Histiophorus gladius* (with *H. americanus* and *H. orientalis*, questionable species, and *H. pulchellus* and *H. immaculatus* young), occurs in the Red Sea, Indian Ocean, Malay Archipelago, and south at least as far as the Cape of Good Hope, lat. 35° S.; in the Atlantic on coast of Brazil, lat. 30° S. to 0, and north to Southern New England, lat. 42° N.; in the Pacific to Southwestern Japan, lat. 30° to 10° N. In a general way, the range may be said to be in tropical and temperate seas, between lat. 30° S. and 40° N., and in the western parts of those seas.

\* Transactions New Zealand Institute, viii, 1875, p. 219.

THE BILL-FISH OR SPEAR-FISH, *Tetrapturus indicus* (with the various doubtful species mentioned above), occurs in the Western Atlantic from the West Indies, lat.  $10^{\circ}$  to  $20^{\circ}$  N., to Southern New England, lat.  $42^{\circ}$  N.; in the Eastern Atlantic from Gibraltar, lat.  $45^{\circ}$  N., to the Cape of Good Hope, lat.  $30^{\circ}$  S.; in the Indian Ocean, the Malay Archipelago, New Zealand, lat.  $40^{\circ}$  S., and on the west coast of Chili and Peru. In a general way, the range is between lat.  $40^{\circ}$  N. and lat.  $40^{\circ}$  S.

The species of *Tetrapturus* which we have been accustomed to call *T. albidus*, abundant about Cuba, is not very unusual on the coast of Southern New England. Several are taken every year by the Sword-fish fishermen. I have not known of their capture along the Southern Atlantic coast of the United States. All I have known about were taken between Sandy Hook and the eastern part of George's Banks.

THE MEDITERRANEAN SPEAR-FISH, *Tetrapturus belone*, appears to be a land-locked form, never passing west of the Straits of Gibraltar.

#### Fossil forms.

Agassiz, in his work on Fossil Fishes, has described two species of *Tetrapturus*: one, *Tetrapturus priscus* (vol. v, p. 91, tab. 31), from the London Clay, in the Isle of Sheppey; the other, *Tetrapturus minor* (vol. v, p. 91, tab. 60 a, figs. 9-13), from the Lewes Crag. The types of the former are in the Paris Museum (others similar in the collections of Lord Emmiskellen and Sir Philip Egerton); of the latter, in the collection of Mr. Mantell.

He has also described the genus *Cælorhynchus*, from fossil fish-beaks which appear to belong to members of the Sword-fish family. These are very long, slender, tapering more gently, even, than in the living forms, and are hollow throughout the entire length. There are two species, distinguished by name, but not described, viz, *C. rectus* and *C. sinuatus*, both from the London Clay of the Isle of Sheppey.

Four extinct species of *Histiophorus* have been described: *H. priscus*, Ag., from the London Clay, the beak of which is not known; *H. minor*, Ag., which has a deeply fluted beak; *H. robustus*, Leidy (Post-pliocene Foss. S. Car. p. 119, *Xiphias*), which is from the Post-pliocene of Ashley River, South Carolina, with beak much depressed, the dentigerous surface a continuous plane, separated by a deep groove; *H. antiquus* (Leidy) Cope, from the New Jersey Eocene, is also a more depressed species, with the dentary surfaces on one plane.\*

At a meeting of the Boston Society, October 6, 1852, Professor Wyman exhibited three fragments of the beak of a fossil *Isthiophorus*, from the Tertiary deposits at Richmond, Va.

*Palæorhynchus*, of the schists of Glaris, has a bill like *Xiphias*; also *Hamorhynchus DesHayes*, first described by Agassiz as *Histiophorus DesHayes*, a Scombroïd with elongated bill.

\* E. D. Cope, Proc. Bost. Soc. Nat. Hist. xii, 1863, p. 311.

ON THE NORTH AMERICAN LAND TORTOISES OF THE GENUS  
XEROBATES.

By FREDERICK W. TRUE.

[Read before the Biological Society of Washington, Dec. 23, 1881.]

The land tortoises, to which this paper is intended to direct attention, are those which are found living within the borders of the United States at the present time. The species, three in number, I shall recognize under the names *Xerobates polyphemus* (Daudin) Cooper, the Gopher; *Xerobates Agassizii* Cooper, Agassiz's Tortoise, and *Xerobates Berlandieri* Agassiz, Berlandier's Tortoise.

The Gopher, to speak in general terms, inhabits the southeastern and southern parts of the United States, *Xerobates Agassizii* the southwestern portion, and *X. berlandieri* the extreme southwest and north-eastern Mexico.

## I. TAXONOMY AND DESCRIPTION OF SPECIES.

HISTORY OF XEROBATES POLYPHEMUS.—In tracing the history of the first of these animals, *X. polyphemus*, we become involved at once in a whirlpool of conflicting opinion and uncertainty. The first allusion to it in zoological literature appears to be in Seba's work upon the curiosities of his museum,\* where an imperfect figure is given under the name "*Testudo terrestris major americana*." No mention of it occurs in the tenth edition of Linnæus' *Systema Naturæ*, but in the interval between the publication of this edition and the twelfth the great naturalist seems to have had his attention called to Seba's figure, for in the latter edition he cites it as the last synonym under his *Testudo carolina*.† From this fact and the additional one that in the thirteenth edition of the *Systema Naturæ*, Gmelin, thinking to improve Linné's somewhat incomplete description of *T. carolina*, added certain remarks on the characteristics of the plastron drawn from a study of the animal portrayed in Seba's work,‡ some naturalists have thought themselves justified in regarding *T.* (or *X.*) *carolina* as the proper name for our gopher. That this is not a correct view of the case is made evident by the consideration of the first of Linné's references, the only one which occurs in the tenth edition. The citation is from George Edwards' *Natural History*, published between 1743 and 1751.

\* Seba, Albert. *Locupletissimi rerum naturalium thesauri accurata descriptio et iconibus artificiosissimis expressio, per universam phisices historiam*. Amsterdam, 1734-1765, i, pl. 80, fig. 1.

† Linné, *Syst. Nat.*, 12th ed., 1766, vol. i, p. 353.

‡ Gmelin, *Linn. Syst. Nat.*, xiii ed., i, pt. 3, 1788, p. 1041.

The phrase quoted is as follows: "*Testudo tessellata minor caroliniana*, Edw. An. 205, t. 205."\* On the same page in Edwards' work on which this phrase occurs, the following description (if we may trust the accuracy of Holbrook†) is given: "The lower shell is divided across the middle of the belly and joined to the upper shell on the sides by a tough flexible skin, by means of which it can, when it draws in its head and legs, close up its shell, as firmly as that of an oyster.‡ It is evident that this description was taken from a specimen of the box tortoise, denominated *Cistudo clausa* in Cope's check-list,§ but which should undoubtedly receive the name *Cistudo carolina*.

It does not seem probable that Linné would have confounded two species so distinct as the box tortoise and the gopher, if he had had definite information regarding the latter. He was undoubtedly misled by the imperfection of Seba's figure, and made to believe that it portrayed the same animal which Edwards had described.

That it may appear still more clearly that Linné's *T. carolina* is the box tortoise, I will quote the pertinent paragraph from Müller's Linné's Systema Naturæ, a translation of the 12th edition, in which extended descriptions of many animals are given. The author states in his preface that he has had access to much of the material which Linné had elaborated. The description of *Testudo carolina* is as follows:

"11. THE CAROLINA TORTOISE. *Testudo Carolina*.—This animal is named from its native country, but is also called Turapin by the English, and Terrapen by the Spaniards. It is smaller than the preceding species [*T. graeca*], and is as much tessellated, but in six-cornered pieces, and is still further distinct in that it has no tail. The color of the plates is dark brown, abundantly sprinkled with yellow patches of different sizes. The plastron is likewise different from that of the former animal, for it is cleft in the middle, and is attached to the upper shield on the sides only by skin so that it can be closed when the animal would hide himself entirely. The head is yellow and provided with scales, similar ones also being on the fore feet; the long neck and the hind feet are of bluish flesh-color. As regards the claws, there are five on the fore feet and four on the hind feet, as in the preceding species."|| This description, taken apparently from a very well preserved specimen, and coming as it does before Gmelin's unfortunate additions, leaves little doubt but that the box tortoise should bear the name *Testudo* (or *Cistudo*) *carolina*. In this opinion I am supported by Holbrook, Duméril, Strach, Say, Harlan, and Gray, while Le Conte, Louis Agassiz, and Cope, at least in his check-list, entertain

\* Linn. Syst. Nat., 10th ed., 1758, p. 198.

† Holbrook, N. A. Herpetology, 1st ed., i, 1836, p. 45.

‡ Edwards, G. A natural history of uncommon birds, and of some other rare and undescribed animals (= Linné's "Edw. An."). London, 1743-'51, p. 205.

§ Cope, Bull. U. S. Nat. Museum, No. 1, 1875, p. 53.

|| Müller, P. L. S. Des Linné Vollständiges Natursystem, Third Part, 1774, pp. 44-45.



a contrary view. Gray proposed the name *T. gopher*, but many years after Daudin had given the tortoise a name.

The next mention of the gopher in literature, succeeding that occurring in Seba's unfortunate plate, is the full and tolerably accurate description given in William Bartram's account of his travels in the Southern States, published in 1791.\* It is described in this work under the name "gopher." This appellation was undoubtedly first given to the animal by the Spanish settlers of Florida, the Spanish word "golfá," meaning pit or burrow, being very appropriate, as pointing to one of the most noticeable proclivities of the gopher, namely, the digging of pits or holes in the ground. The derivation of the first syllable of the word "mungöfa," a name given by Holbrook in later years as one in popular use, I have been unable to determine. It may be a corruption of "muñon," brawn or muscle, and refer to the great strength of the animal, or may be of African origin.

Daudin, in his Natural History of Reptiles, published in 1803,† appears not to have noticed the remarks of Gmelin upon Linné's *T. Carolina*, accepts Bartram's statement as to its being an entirely new species, gives it the name *Testudo polyphemus*, and adds a latin diagnosis. He also paraphrases Bartram's description and notes.

In later times the gopher has been described among European writers by Bose, in 1803, under the name "La Tortue Gopher"; by Gray, in 1831, 1844, and 1855, under the names "*Testudo polyphemus*," and "*Testudo gopher*."‡ Holbrook places *T. depressa* of Cuvier,§ among his synonyms of *T. polyphemus*,|| but apparently without reason, for nothing relative to the tortoise except the words "*T. depressa*, Cuv." appears in that work on that page or elsewhere.

Among the earlier American zoologists who have written regarding the gopher I may mention Say, who wrote in 1825, using the name *T. polyphemus*;¶ Le Conte, who wrote in 1829 (?), employing the name *T. carolina*;\*\* Harlan, who wrote in 1829, applying the name *T. polyphemus*;†† and Holbrook, who wrote in 1836 and 1842, using the name *T. polyphemus*.‡‡

A list of all the writings in which reference to this and the remaining species of North American *Testudinidae* indisputably occurs, such as I

\* Bartram, W. Travels through North and South Carolina, &c. Philadelphia, 1791, pp. 182-183.

† Daudin. Histoire Naturelle des Reptiles, Paris, ii, 1803 (X), pp. 256-259.

‡ Bose. Nouv. Dict. d'Hist. Nat., xxii, 1803, p. 269.—Gray, Synopsis Reptilium, Pt. I, p. 11 (*T. polyphemus*); Gray, Tort. British Museum, 1844, p. 4 (*T. gopher*); Gray, Shield Reptiles, Pt. I, 1855, p. 5 (*T. gopher*).

§ Règne Animal, ii, p. 10.

|| Holbrook, N. A. Herpetology, 1st ed., i, 1836, p. 41.

¶ Say, Jour. Acad. Nat. Sci. iv, pl. ii, 1825, pp. 207-208.

\*\* Le Conte, Annals Lye. Nat. Hist., New York, iii, 1828-1836, pp. 97-100.

†† Harlan, Jour. Acad. Nat. Sci. Phila., vi, pt. i, 1829, pp. 21, 22.

‡‡ Holbrook, N. A. Herpetology, 1st ed., i, 1836, pp. 41-46; 2d ed., 1842, pp. 25-30.



have been able to make up from the literature at command, will be found at the close of this article.

**ESTABLISHMENT OF THE GENUS XEROBATES.**—In 1857, Louis Agassiz placed the American gophers in the new genus *Xerobates*, a distinction which has been accepted by Cope,\* Gray, and other herpetologists. The characters of the genus are based on the form of the alveolar surfaces of the jaws and on the form of the fore feet and claws. The latter characters, however, in my opinion, are of less generic value than the former, since *X. Berlandieri*, which agrees with *X. polyphemus* and *X. Agassizii* in form of alveolar surface, has fore feet but little compressed; and even in the two last-named species the amount of compression varies considerably. The bluntness of the claws is due largely to the nature of the soil in which the animals live and to their habit of burrowing. The claws of the young, in all the species, are sharp, and but little compressed, although almost perfectly straight.

**HISTORY OF XEROBATES AGASSIZII.**—The history of the scientific discovery of the western gopher, unlike that of its eastern relative, is a very simple one. The tortoise was first made known to science by Dr. J. G. Cooper in a paper on "New Californian Animals," read before the California Academy of Sciences, July 7, 1861, and published in the second volume of the proceedings of that society, issued in 1863. The description is as follows:

"Professor Baird thinks with me that the following will undoubtedly prove a new species, after a comparison of specimens:

"**XEROBATES AGASSIZII.**—Agassiz's Land-Tortoise.

"*Spec. char.*—Young, with the carapax higher and more arching than in *X. carolinus*; the margin serrate all round, the primary disks of the scales projecting from a tenth to an eighth of an inch. Color of primary disks entirely pale yellow, the annual rings of growth only being dark brown. (Young just hatched, probably all yellow.)

"*Remarks.*—Closely resembles *X. carolinus*, the 'Gopher' of Florida and the other Cotton States, of which no descriptions accessible are full enough to enable me to point out all the differences. But as another species intervenes between the range of that and this one, namely, *X. berlandieri* of Agassiz, found in Southern Texas and Mexico, I feel confident that comparison of specimens will show constant distinctions between them. From *X. berlandieri* it differs even more than from *carolinus*. Besides the serrate margin, which is most distinct in my youngest specimens (four years), while Agassiz's figure of the young has no serrations, and different coloration, it has but twenty-four instead of twenty-six marginal scales (abnormal in his figured specimen?), and the primary disk of the vertebral scales is more than half as long (antero-posteriorly) as it is broad, instead of about twice as broad as long. The other scales also differ in details of form.

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\* Cope, Bull. U. S. G. & G. Survey, iv, 1878, p. 393.

"Three young specimens, a male of seven years of age, two females of six and four years, obtained from the mountains of California, near Fort Mojave."\*

The next account published is the very meager one contained in Cronise's "Natural Wealth of California," issued in 1868. The herpetology of this work was outlined or written, in part or entirely, by Dr. J. G. Cooper. The paragraph relating to Agassiz's Tortoise is as follows: "Agassiz's Tortoise (*Xerobates Agassizii*) is found only in the southeast quarter of California, which is both the driest and warmest. They grow a foot in length, and live wholly on vegetable food, closely resembling the tortoise called Gopher (*i. e.*, burrower), in the Gulf States. They are like that and most other species, eatable, but not very well flavored."†

The name *Xerobates Agassizii* alone appears again in Dr. Cooper's paper on "The Fauna of California and its Geographical Distribution," read before the California Academy, September 6, 1869,‡ and also in Cope's Check-list of Reptiles, published in 1875.§

These descriptions and allusions, together with one other to which I shall presently refer, complete, so far as I am aware, the literature of the subject. As they do not furnish sufficient data for the identification of the mature animal, I have judged it not unimportant to add a description of the species, drawn from a careful study of specimens of adults and young in the National Museum, and to point out the characters which separate it from *Xerobates polyphemus*.

DESCRIPTION OF *XEROBATES AGASSIZII* COOPER.—The shell is considerably depressed, and nearly flat above. Its margin is serrate all around, except in specimens worn by attrition with the soil, but most strongly behind and in front, and is quite strongly revolute over the thighs and shoulders. The center of each plate of the carapace (with the exception of the marginals) is raised, forming a sort of boss; the bosses of the anterior and penultimate vertebral plates are not prominent. The vertebral plates are five in number; the anterior hexagonal, the shortest side abutting against the nuchal plate; the second hexagonal, the posterior side longest; the third hexagonal, the anterior and posterior sides of equal length; the penultimate hexagonal, the anterior side a little the longest; the posterior hexagonal, the posterior side longest, the posterior angles very obtuse, making the plate appear almost quadrilateral. The first lateral plate is irregularly heptagonal, but the anterior angles are very obtuse, so that the plate often appears to be quadrilateral or rudely triangular, with a rounded inferior side. The second and third laterals are heptagonal, the lower angles as before; the fourth is quadrilateral, the anterior side a little the longest. The marginal

\* Proc. Cal. Acad. Sci., ii, 1863, pp. 120, 121.

† Cronise, The Natural Wealth of California, San Francisco, 1868, p. 480.

‡ Proc. Acad. Cal. Sci., iv, 1873, p. 67.

§ Cope, Check-list N. A. Bat. & Rept., Washington, 1875, p. 54.

plates are twenty-four in number. The nuchal is irregularly quadrilateral, broadest behind. The supra-candal is single, large, twice as long as high, and but slightly bulging. It stands in an almost vertical position. The first marginal plate is irregularly pentagonal; the second and third quadrilateral or pentagonal; the fourth pentagonal; the fifth quadrilateral; the sixth pentagonal; the seventh to the eleventh, inclusive, quadrilateral. All the plates are about equally striated with concentric lines.

The sternum is very thick, and in adults extends about an inch beyond the anterior edge of the carapace. The gular plates together form an elongated pentagon, but there is sometimes a deep notch between them anteriorly. The brachial plates are quadrilateral, the free border longest; the anterior borders, which receive the posterior sides of the gular plates, together crescentic in outline. The surface of these plates, unlike that of those of *X. polyphemus*, is level in the antero-posterior direction. The thoracic plates are rudely quadrilateral, narrow, and but little expanded at their outer extremities. The abdominal plates are nearly quadrilateral, but less nearly square than in *X. polyphemus*. The femoral plates are also rudely quadrilateral, but much narrower than in *X. polyphemus*, the interior lateral border being scarcely more than half the length of the anterior side. The subcaudal plates, which do not differ from those of the eastern species, are rudely quadrilateral, the interior lateral border being a little shorter than the exterior.

These characters, as in all tortoises, are quite variable and unsatisfactory.

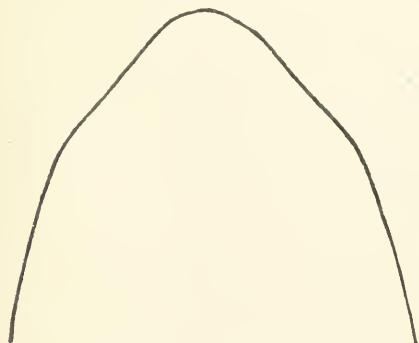


FIG. I.—*X. POLYPHEMUS*.

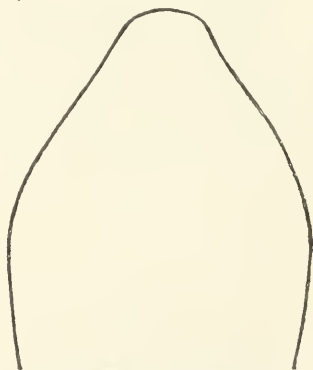


FIG. II.—*X. AGASSIZII*.

Contour of the head shown by passing a plane through the lowest point of the orbit parallel to the upper surface of the head.

The head is considerably compressed at the sides and elongated. Its superior surface is covered with flat scales, which decrease in size backward, and are usually divided into pairs between the eyes, and very large. The nostrils are quite small and near together, and are raised a little above the upper edge of the sheath of the upper jaw. The eyes are large and

look a little forward; they are situated high in the head. The jaws are irregularly but quite finely serrated, the margins being almost in a straight line. The sheath of the upper jaw is very high, between the snout and the eye, but becomes narrowed abruptly under the eye. The neck is of moderate length, with granulated skin.

The anterior extremities are large, stout, and more or less compressed in the antero-posterior direction. The claws, five in number, are short, stout, and not curved. The scales on the anterior aspect of the arm are all approximately equal in size. Those on the exterior edge are a little larger. On the posterior surface the scales decrease in size gradually from the exterior to the interior edge.

The posterior extremities are terete, the feet elephantoid, the soles being large and round in contour. The scales surrounding the edge of the sole are large, the two posterior ones being very thick and broad. The four nails or claws resemble those of the fore feet, but show a slight tendency to curve. There are two or three prominent scales on the posterior part of the thigh.

The tail, although very short, is considerably longer than that of *X. polyphemus*.

The general color of the whole animal is brown. The centers of the plates of the carapace in the young, and in some adult specimens, is light tawny yellow. The color of the plastron is usually a little lighter than the general color of the carapace.

In this description I have followed as closely as possible that given by Dr. Holbrook, for *X. polyphemus*, in order that the two may be contrasted.

**SPECIFIC DISTINCTIONS.**—The leading difference in structure between *X. polyphemus* and *X. Agassizii*, one which is constant in all ages, is in the size of the fore feet as compared with the size of the hind feet. This distinction may be formulated as follows: The distance from the base of the first claw of the hind foot to the base of the fourth claw equals the distance from the base of the first claw of the fore foot to the base of the third claw in *X. polyphemus*; the fourth claw in *X. Agassizii*.

Again *X. polyphemus*, at all ages, has the anterior end of the plastron bent upward quite sharply toward the carapace, a character which does not occur in *X. Agassizii*. The inguinal plates of the former species do not usually exceed four in number—one large one and two or three small ones internal to it—and are set obliquely. Those of *X. Agassizii* are usually five or six in number—two large ones and three or four small ones between them—and are set vertically. *X. polyphemus* has one scale on the inner aspect of the knee-joint of the fore leg very much larger than the others covering that member, while in Agassiz's Tortoise all are approximately equal. This character is most noticeable in the young. The horny sheath of the upper jaw extends further back of the eye in *X. polyphemus* than in *X. Agassizii*. Other characters of less importance



might be added, but these will suffice, I think, to render the two species readily distinguishable. The relative proportions of the fore and hind feet is a matter of especial importance.

**HISTORY OF XEROBATES BERLANDIERI.**—The third species to be considered is *Xerobates Berlandieri* Agassiz, the only published description of which is contained in Agassiz's Contributions to the Natural History of the United States, volume i, page 447. The notice is so short that I will quote it in full. It is as follows: "XEROBATES BERLANDIERI, Ag. The young is represented Pl. 3, fig. 17-19. It has a small yellow dot in the centre of the median and costal scales; the marginal scales are only edged with yellow. The sternum is narrower and more projecting in front than that of *X. carolinus*; in the adult it is even forked. Behind it is broader and more turned downward. The centre of the scales remains granular for a longer time. The gland of the lower jaw is larger and more prominent. This species is smaller than the preceding, and limited to southern Texas and Mexico. All the specimens that I have seen were forwarded to me for examination by the Smithsonian Institution. They were collected by the late Mr. Berlandier, a zealous French naturalist, to whom we are indebted for much of what we know of the natural history of northern Mexico."\*

The use of Berlandier's name in the denomination of this species is very appropriate, since that unfortunate naturalist was not only the first to collect specimens of the tortoise, but was the first to describe it. His manuscripts, deposited in the Smithsonian Institution, contain an extended description of the animal, under the name *Testudo tuberculata*, together with a carefully-drawn figure, and some notes on its distribution.

Mention of this animal occurs in later times in the writings of Strach,† Gray,‡ Baird,§ and Cope,|| but, with the exception of the last two naturalists, all regard it merely as a synonym of *X. polyphemus*. Professor Baird enumerates it among others as a separate species, giving the scientific name which Agassiz has applied and the common name, "Texas Gopher." Cope also employs Agassiz's name, and adds, "I obtained a specimen of this land tortoise, collected by Mr. Marnock in the southwestern part of the State [Texas], where, according to that gentleman, it is common. He has also found it near San Antonio. I did not meet with it on the first plateau." That it is a separate species I think no one who has compared the heads of the two can doubt. The following description is intended to show that Berlandier's Tortoise is a species entirely distinct from the gopher, and not merely a variety of the latter as Strach and some other writers have supposed.

**DESCRIPTION OF XEROBATES BERLANDIERI.**—Shell short and high, slightly emarginate and revolute in front, strongly incurvated behind.

\* Agassiz, Cont. Nat. Hist. U. S., i, 1857, p. 447.

† Strach, Mem. Acad. Imp. Sci. St. Peterbourg, vii series, viii, 1865, article 13, p. 28.

‡ Gray, J. E., Proc. Zool. Soc. London, 1873, p. 723.

§ Baird, Herpetology Mex. Bound. Survey, 1859, p. 4.

|| Cope, Bull. U. S. N. Museum, No. 17, 1880, pp. 13 and 47.



Of the five vertebral plates, the anterior is pentagonal, the two posterior angles right angles; the second and third are hexagonal, the anterior and posterior lateral margins approximately equal; the fourth is hexagonal, the posterior lateral border longer than the anterior lateral and curved inward; the fifth is hexagonal, the anterior lateral borders longest. The first lateral plate is quadrilateral (or resembles a triangle with a rounded apex), the lower border presenting rounded angles, and joined to the first four marginal plates; the second and third are hexagonal, the lower angle very obtuse; the posterior is quadrilateral and in adults nearly square. There are twenty-four marginal plates. The nuchal is small, quadrilateral, largest in front, or square; the supra-candal is quadrilateral, but considerably less than twice as broad as high. The marginal plates differ much in different specimens. The first is rudely pentagonal, usually with an acute angle directed toward the nuchal; the remainder are irregularly quadrilateral; the sixth, however, is sometimes plainly pentagonal. In adults, the center of the eighth, ninth, tenth, and eleventh plates is usually strongly depressed, the free border being revolute.

The sternum is broad and convex at the sides, and extends an inch or less beyond the carapace in front. Each gular plate is quadrilateral. They are united, the anterior border of the resulting pentagon being invariably emarginate, often very strongly notched. The nuchal plates change shape to a remarkable degree from youth to maturity. In the newly-born animal they are broad and short, but in the adult they are narrow and elongated. The brachial are quadrangular; in the adult, both free and posterior borders convex. The thoracic are rudely quadrilateral, and very narrow at their juncture in the median line. The femoral are quadrilateral, very long and broad, covering more than a third of the sternum; the anterior and posterior borders parallel. The abdominal are rhomboidal, the exterior side longer than the interior, and convex. The sub-candal are quadrilateral, with a notch of medium depth between them posteriorly. The axillary are usually three in number—one large one between two small ones. The inguinal are also three in number, arranged as are the axillary plates.

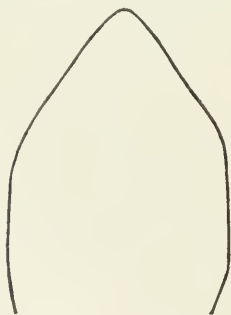


FIG. III.—X. BERLANDIERI.

Contour of head obtained as before.

The head is slightly elongated, deep, and from the eyes forward wedge-shaped; it is covered with flat scales of moderate size which in adults are approximately equal. In the young the scales on the fore part of the head are clearly larger than elsewhere and are divided into pairs, but these distinctions become unappreciable in the adult. There is usually also one very large scale over the tympanum. Nostrils moderate. Eyes large, set obliquely, and looking slightly for-

ward; lower lid about three times as broad as the upper. Jaws short and thick; sheaths short and deep, that of the upper jaw ending under the middle of the eye; a depression beneath the eye. The two tooth-like processes at the symphysis of the lower jaw large and high, giving the cutting margin a concave outline.

Anterior extremities not greatly larger than the posterior, frequently compressed in the antero-posterior direction, but sometimes nearly terete. Five claws with stout nails. The whole anterior surface of the leg covered with very large rounded scales, approximately equal in size. Scales on the sole of the foot large.

The posterior extremities are terete and clavate, and bear four flattened, pointed nails. Scales on the heel large, two especially so.

Color of the carapace yellowish-brown, the surface within the smaller stria of each plate yellow. Sternum light dirty yellow. Head and legs yellowish gray. Jaws yellowish.

**SPECIFIC DISTINCTIONS.**—The main differences which separate *X. Berlandieri* from *X. polyphemus* and *X. Agassizii* relate to the size and shape of the head and jaws, the size and shape of the legs, and to the height of the shell. In *X. polyphemus* the length of the carapace is more than twice the height of the shell, while in *X. Berlandieri* the length of the former is considerably less than twice the height of the latter. In the former species the fore legs are largest at the extremity, while in the latter they are largest at the knees. In *X. polyphemus* again the cutting edge of the lower jaw is nearly straight, while in *X. Berlandieri* it is very considerably arched, giving the mouth a *hawk's bill* appearance. Many other minor differences exist in the arrangement of scales on the legs, and the like.

**SIZE.**—Of the three species, *X. Berlandieri* is the smallest. The adults of *X. polyphemus* and *X. Agassizii* are of about equal size. The following table gives the actual measurements of greatest length and breadth of six adult specimens:

Species.	Locality.	Length of carapace.	Depth of shell.
		Inches.	Inches.
<i>X. polyphemus</i> :			
No. ———		8½	3½
No. 9627	Florida	8½	4
No. (33)	Nashville, Ga	11	4½
<i>X. Agassizii</i> :			
No. 10412	Fort Yuma, Cal...	10	4½
No. ———	—, Cal	8½	3½
<i>X. Berlandieri</i> :			
No. 8926a	Brownsville, Tex	7	3½
No. 8926b	Brownsville, Tex	6½	3½

**ALLIED GENERA.**—The Brazilian Tortoise, *Chelonoidis tabulata*, inhabiting the northern parts of the neotropical region, although resembling, when half grown, the species of *Xerobates*, differs from them all in characters of generic value, such as the absence of a nuchal plate,

and the presence of a pit in place of a ridge in the horizontal alveolar surface of the upper jaw, at the symphysis.

FOSSIL SPECIES.—In 1878, Professor Cope placed two fossil tortoises from Kansas in the genus *Xerobates*, under the names *X. orthopygius* and *X. cyclopygius*. The skull of the latter species, however, was not found, and, the author states, "it is not certain that it belongs to the genus *Xerobates*."\* *X. orthopygius*, if I understand the description correctly, is an aberrant form as far as regards its shell, and may belong to a subgenus. As I have no fragments of these animals at command I cannot speak with confidence regarding either of them.

## II. HABITS AND CAPTURE.

HABITS OF THE GOPHER.—Regarding the habits of the gopher considerable has been written by Holbrook, Bartram, Louis Agassiz, Say, and other observers and writers of less note. These all agree that it is an animal of docile nature, preferring situations of the utmost dryness and reveling in an abundance of sunshine and warmth. It has an innate repugnance to rain and all moisture, and at the approach of winter retreats to the depths of its burrow and becomes dormant. Its native home is in the sandy pine barrens of the South; far from them it is never found.

The habit of digging pits or dens in the earth seems to be peculiar to this genus of tortoises; I have been unable to find proof of any similar proclivity existing among tortoises of allied genera inhabiting other countries. "The domicile of the Gopher," observes Dr. Savage, "consists of an excavation of a size at the mouth just sufficient to admit the animal, and runs in an oblique direction to the depth of about four feet. From the entrance it enlarges and expands to a considerable extent, resembling in its interior outline a vessel of globular shape. Being concealed, it is sometimes a dangerous cavity to horsemen at full speed. It is inhabited by but one pair."†

The remarks of Rev. C. F. Knight, on the habits of this species, made before the Boston Society of Natural History, June 15, 1870, disagree somewhat with this account. He states that the gallery leading to the burrow is often sixteen feet long, sinking to a depth of twelve feet, and that the latter consists of several chambers. At the mouth of the burrow there is always a mound or hillock of considerable size, formed by the earth which the animal casts behind him in excavating.

Forbes states that gophers are sometimes forced to share their quarters with a brood of rattlesnakes, these unwelcome lodgers intruding themselves here as they do into the homes of the prairie dog. Rev. Mr. Knight, in the communication just referred to, affirms that, "on one

\* Cope, Bull. U. S. G. & G. Survey, iv, 1878, pp. 393-395.

† Dr. Th. Savage in Louis Agassiz's Cont. Nat. Hist. U. S., i, 1857, p. 447.

occasion, a pair of opossums, a raccoon, a rattlesnake more than six feet long, and two other snakes, besides several of the native black rats of the district (Florida) were taken from one of these holes."\*

The gopher is entirely graminivorous, feeding upon various succulent vegetables and grass. It does not distinguish between wild and cultivated plants, and often causes much annoyance to planters in the South by devouring great quantities of the sweet-potato vine and other garden vegetables. It is also fond of the gum which exudes from the pine tree. It has been generally supposed that the gopher wanders from its den in search of food only at night, but the animals which Holbrook kept in confinement partook of food at all hours of the day indifferently.

There is need of more extended information regarding the breeding habits of gopher. The account of Dr. Savage, which, so far as I am aware, contains all that has been published on the subject, is not derived from personal observation, and is incomplete in some details. From him we learn, however, that the eggs are not deposited in the burrow itself, but at some point near the mouth. "The habit of the animal in oviposition, it is said, is to draw a circle on the ground about four inches in diameter, and to excavate within this to a depth of about the same number of inches, expanding as it proceeds, in a manner similar to that adopted in making its domicile. In this are deposited five white eggs, of a round form. The number being complete, the cavity is filled with earth and pressed down smoothly, and to a level with the surface, by the weight of the animal. The time in hatching is said to be between three and four weeks. The month in which they lay is June."†

The age attained by *Xerobates polyphemus* is a matter of some dispute. Some herpetologists hold that the number of concentric striae on the dorsal scales of a tortoise form a reliable index to the number of years of its life, one ring being formed annually. But for the species under consideration, at least, I am convinced that little is to be learned from an examination of these striae. Specimens, apparently of advanced age, are frequent in which long attrition with a sandy soil has effaced all traces of striation from the shell. Furthermore, I conceive that if the growth of the layers of the scales is connected with the phenomenon of hibernation, owing to the varying mildness of southern winters, two or more layers might be formed in a single year.

As the alligator snapper (*M. lacertina*) is the strongest of American tortoises, as regards its jaws, so the gopher, as regards its legs. That it will walk about with a man standing upon its back is a fact too commonly observed to admit of doubt. Le Conte writes that it can support a maximum weight of 600 pounds; but this statement is not derived from his own observation.

The ordinary mode of capturing the gopher is to dig a pit at the en-

\*Proc. Boston Soc. Nat. Hist., xiv, 1872, p. 16.

†Th. Savage, loc. cit.



trance of the burrow, into which the animal will fall when emerging from the latter in search of food. Wailes, however, in his report on the resources of Mississippi, gives an account of another method, which was related to him, but which it would seem must be taken *cum grano s&ulo*. He writes: "A common box terrapin is used for the purpose, being driven into the gopher's hole, from which he is speedily driven out; but, in the eagerness of pursuit, the gopher frequently follows him so far above ground as to be cut off from his retreat and captured by the waiting hunter."\*

HABITS OF AGASSIZ'S AND BERLANDIER'S TORTOISES.—Regarding the habits of Agassiz's and Berlandier's tortoises, but little has been recorded. The following notes by Mr. E. T. Cox are of recent date and point to a similarity of habits, except in the last particulars, between the eastern and western gophers. Speaking of *Xerobates Agassizii*, he says: "He is a vegetarian, feeding, as I am told, on cacti. His flesh is highly esteemed as food by the Indians and Mexicans. You will perceive that his mandibles are notched or toothed. His legs are covered with bony scales, and his front toe nails are made long and strong for digging amongst the rocks, while the hind feet are round like an elephant's. \* \* \*

"In preparing the specimen, I found on each side, between the flesh and carapax, a large membranous sack filled with clear water; I judged that about a pint run out, though the animal had been some days in captivity and without water before coming into my possession.† Here then is the secret of his living in such a dry region; he carries his supply of water in two tanks. The thirsty traveler, falling in with one of these tortoises and aware of this fact, need have no fear of dying of immediate want of water."‡

I consider it doubtful whether Berlandier's tortoise digs burrows. The form of the legs is such that excavation by their aid would be a very tedious process. I have been unable to find any notes relating to its habits, save the single sentence in Berlandier's manuscript: "Elle est herbivore."

Its eggs, unlike those of the other species, are elliptical.

### III. GEOGRAPHICAL DISTRIBUTION.

It is somewhat difficult at the present time to work out with exactitude the geographical distribution of the three North American *Xerobates*, owing to a "plentiful lack" of citations of the exact localities in which specimens have been found. In a general way, however, little difficulty is encountered.

DISTRIBUTION OF THE GOPHER.—The National Museum has specimens of *X. polyphemus* from Saint Simon's Island, Ga. (7551); Nashville,

\* Wailes, Geology of Mississippi.

† Regarding this matter I may have somewhat to say at a later date.—F. W. T.

‡ Amer. Nat., xv, 1881, p. 1003.



Ga.; Clear Water, Fla. (16057); Homossasa, Fla. (10069-70); Gainesville, Fla. (10471), and Brownsville, Tex. (8926), together with others labeled East Florida (7554-55-57). I have a memorandum in my possession stating that Mr. G. Brown Goode shipped 19 specimens of this animal, collected in the vicinity of Arlington, Fla., to the zoological gardens in Philadelphia. Bartram found traces of them south of the Savannah River, in Georgia and Florida. Holbrook states that they are numerous in Edgefield and Barnwell districts (S. C.), whence they extend through Georgia, Alabama, and the Floridas, and that, "According to Le Sueur, they are brought to the New Orleans market, though probably not from the immediate neighborhood."\* Wailes knew of their existence in the southern part of Mississippi.

From these data it would appear that *Xerobates polyphemus* inhabits all the drier portions of the Austroriparian region, from Southern South Carolina to the Rio Grande del Norte, with the exception, perhaps, of Southern Florida. Furthermore, Gray was informed of its introduction into Cuba, where, according to Mr. W. S. MacLean, it "lives in domestication."†

DISTRIBUTION OF AGASSIZ'S TORTOISE.—Of the species *Xerobates Agassizii* the U. S. National Museum has specimens from Fort Mohave, Ariz. (6718); Dr. Cooper's types from the Solado Valley, Cal. (7888), and from Fort Yuma, Cal. (10398-99, 10412).

The distribution of this tortoise, therefore, must be limited for the present to the southern, sandy desert portions of California and Arizona.

DISTRIBUTION OF BERLANDIER'S TORTOISE.—*Testudo Berlandieri* was described by Agassiz from specimens from Northern Mexico. Berlandier writes: "It inhabits the plains of Tamaulipas between Matamoras and San Fernando de las Presas. At Laredo, on the banks of the Rio Bravo, this tortoise forms an important article of diet for the soldiers of the presidios when crossing the deserts." Cope, as we have seen, knew of specimens from San Antonio, Tex., and of the occurrence of the animal in the southwestern part of that State generally.

Its distribution, therefore, would seem to be limited to the lower regions of Texas and northeastern Mexico, between the twenty-fifth and thirtieth parallels.

#### IV. SYNOPSIS OF THE SPECIES.

Terrestrial; horizontal alveolar surface of the upper jaw with two ridges; an interval at the symphysis, occupied by a transverse ridge; a notch in the lower jaw fitting over the transverse ridge. Anterior extremities more or less compressed in the antero-posterior direction; posterior extremities clavate; nails 5:4 ..... *Xerobates*.

\* Holbrook, N. A. Herp., 1st ed., i, 1836, p. 44.

† Ann. and Mag. Nat. History, 1st series, v, 1840, p. 115.

\* Shell more than twice as long as high; head rounded in front; margin of jaws straight; fore-legs broadest at the extremity.

Anterior part of the plastron bent upward. Distance from base of 1st claw to base of 4th claw, hind foot, equal to distance from base of 1st claw to base of 3d claw, fore foot. . . . *X. polyphemus*.

Plastron level in the antero posterior direction. Distance from base of 1st claw to base of 4th claw, hind foot, equal to distance from base of 1st claw to base of 4th claw, fore foot. . . *X. Agassizii*.

\*\* Shell less than twice as long as high; head wedge-shaped in front; margin of jaws curved; fore-legs broadest at the knee. . . *X. Berlandieri*.

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U. S. NATIONAL MUSEUM, Washington, January 27, 1882.

**CATALOGUE OF A COLLECTION OF JAPANESE COTTON FIBER  
PRESENTED TO THE UNITED STATES NATIONAL MUSEUM BY  
THE GOVERNMENT OF JAPAN, TOGETHER WITH THE AMOUNT  
OF THE ANNUAL CROP OF JAPAN AND THE PRICE OF COTTON.\***

[Prepared by the Japanese Legation.]

No. 1. Cotton produced by—

Konishi Shojiro,

Awadono mura, Soyekami-gori.

Yamato, Osaka-Fu.

Annual crop, about 225 kin = 298.14075 pounds.

Market price, 7.1 sen per 1 kin = 1.32507 pounds.

\*NOTE TO THE CATALOGUE OF THE COLLECTION OF COTTON.—Of the suffixes to the words signifying the localities of producers, "mura" means village and "gori" township, and in the catalogue is mentioned next to the township the name of a geographical division or province, and then follows a political division.

NOTE TO THE ACCOUNT OF COTTON HUSBANDRY.—The district of Kinai, strictly speaking, comprises the provinces of Yamashiro, Yamato, Kawachi, Idsumi, and Settsu, but in the sense used in the account that district may also comprise some other neighboring provinces. The district of Kanto comprises the province of Musashi and other seven adjacent provinces. The district of Chingoku consists of all the provinces lying south of those of Harima and Tamba and north of Nagato and Suwo. The district of Kiushiu is the whole of the island of that name. The district of Tô-oku comprises the northeastern part of the province of Ô-shû, which is now divided into five provinces. And the district of Hokuroku includes seven provinces—Wakasa, Tetchizen, Kaga, Noto, Tetchin, Fechigo, and Sado.

## No. 2. Cotton produced by—

Shiokawa Daigoro,

Higashi-ajiro-mura, Shibukawa-gori,

Kawachi, Osaka-Fu.

Annual crop, about 3,905 kin = 5,174.39835 pounds.

Market price,  $9\frac{3}{5}$  sen per 1 kin = 1.32507 pounds.

## No. 3. Cotton produced by—

Yamada-Heishiro,

Shinmachi-mura, Sumiyoshi-gori,

Settsu, Osaka-Fu.

Annual crop, about 419 kin = 555.20433 pounds.

Market price,  $11\frac{1}{2}$  sen per 1 kin = 1.32507 pounds.

## No. 4. Cotton produced by—

Naka Saburobeye,

Sakuratsuka-mura, Toshima-gori,

Settsu, Osaka-Fu.

Annual crop, about 334 kin = 442.57338 pounds.

Market price,  $7\frac{4}{5}$  sen per 1 kin = 1.32507 pounds.

## No. 5. Cotton produced by—

Midsutani Kiyoji,

Nishikata-mura, Kuwana-gori,

Ise, Miye-ken.

Annual crop, about 276 kin = 365.71932 pounds.

Market price,  $8\frac{3}{5}$  sen per 1 kin = 1.32507 pounds.

## No. 6. Cotton produced by—

Akita Heiyemon,

Uyeno-mura, Aki-gori,

Ise, Miye-ken.

Annual crop, about 1,314 kin = 1,741.14198 pounds.

Market price, 7.3 sen per 1 kin = 1.32507 pounds.

## No. 7. Cotton produced by—

Tanaka Heihachi,

Shinowara-mura, Aichi-gori,

Owari, Aichi-Ken.

Annual crop, about 194 kin = 257.06358 pounds.

Market price, 8 sen per 1 kin = 1.32507 pounds.

## No. 8. Cotton produced by—

Suzuki Hikozaemon,

Nakane-mura, Hadsu-gori,

Mikawa, Aichi-ken.

Annual crop, about 250 kin = 331.26750 pounds.

Market price, 7.3 sen per 1 kin = 1.32507 pounds.

No. 9. Cotton produced by—

Fukazawa Moheye,  
Senakawa-mura, Anbara-gori,  
Suruga, Shidzuoka-ken.

Annual crop, about 313 kin = 414.74691 pounds.

Market price, 6.7 sen per 1 kin = 1.32507 pounds.

No. 10. Cotton produced by—

Kawanishi Chojiuro,  
Nanko-mura, Maka-kioma-gori,  
Kai, Yamanishi-ken.

Annual crop, about 675 kin = 894.42225 pounds.

Market price, 8.3 sen per 1 kin = 1.32507 pounds.

No. 11. Cotton produced by—

Ishii Riohei,  
Kamo-mura, Niiharu-gori,  
Hitachi, Ibaraki-ken.

Annual crop, about 175 kin = 231.88725 pounds.

Market price,  $8\frac{7}{8}$  sen per 1 kin = 1.32507 pounds.

No. 12. Cotton produced by—

Sumigama Denbeye,  
Magari-mura, Nakashima-gori,  
Mino, Gifu-ken.

Annual crop, about 5,100 kin = 6,757.857 pounds.

Market price,  $7\frac{4}{5}$  sen per 1 kin = 1.32507 pounds.

No. 13. Cotton produced by—

Miyasaka Kansaku,  
Riokusheki-mura, Sarashina-gori,  
Shinano, Nagano-ken.

Annual crop, about 262 kin = 347.16834 pounds.

Market price, 8 sen per 1 kin = 1.32507 pounds.

No. 14. Cotton produced by—

Narita Shodayu,  
Wada-mura, Ohi-gori,  
Wakasa, Fukui-ken.

Annual product, about 150 kin = 198.7605 pounds.

Market price, 8.7 sen per 1 kin = 1.32507 pounds.

No. 15. Cotton produced by—

Hamada Jirokichi,  
Morioka-mura, Kuwaimi-gori,  
Hoki, Shimane-ken.

Annual crop, about 1,656 kin = 2,194.31592 pounds.

Market price, 8 sen per 1 kin = 1.32507 pounds.



## No. 16. Cotton produced by—

Mishima Okataro,  
Oki mura, Kuboya-gori,  
Bitchiu, Okayama-ken.

Annual crop, about 1,950 kin = 2,583.8865 pounds.

Market price,  $9\frac{1}{2}$  sen per 1 kin = 1.32507 pounds.

## No. 17. Cotton produced by—

Kami-mura Kametaro,  
Imatsu-mura, Chinka-gori,  
Suwo, Yamaguchi-ken.

Annual crop, about 1,725 kin = 2,285.74575 pounds.

Market price, 8.7 sen per 1 kin = 1.32507 pounds.

## No. 18. Cotton produced by—

Uramoto Joichiro,  
Naka-mura, Amakusa-gori,  
Higo, Kumamoto-ken.

Annual crop, about 2,275 kin = 3,014.53425 pounds.

Market price,  $8\frac{3}{4}$  sen per 1 kin = 1.32507 pounds.

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 BRIEF ACCOUNT OF COTTON HUSBANDRY IN JAPAN.

Cotton is produced along the coasts, and where there are sandy soils in the warm parts of so-called districts Kinai, Kanto, Chingoku, and Kiu-shiu; but in the most northeastern parts of so-called districts Tô-oku and Hokuriku, where frost visits very early, the soil is unsuitable for the cultivation of cotton, so that it is very rarely cultivated.

Although the era of the cultivation of cotton in the empire is yet uncertain, as there are various opinions, it is certain that the mode of the cultivation in western provinces was introduced from Kinai, and that the seeds grown in eastern provinces were brought from the province of Mikawa. It seems, however, that the modes of all the provinces westward from Kinai would have been developed in a very accurate manner and that the general objects turned to obtain more and more good crop. So it is; in the province of Settsu the crop is largest and could never be surpassed by that of all the other provinces throughout the empire, though the expenditure for the cultivation in that province is nearly two times that of another province where the expenditure is smallest, but as the staples are rather short and hard it is not suitable for the consumer for both spinning very fine yarns and weaving fine and delicate goods. In recent years cotton yarns are imported on a large scale, and on account of fine yarn being easily got, the home-produced cotton must, it seems, be spun into coarse counts for warp and used also for stuffing. Taking this as a cause, it became finally the general custom to prefer a cotton plant which produces a larger amount of cotton wool to all the other sorts, whether the staple is long or short

and hard or soft. Therefore, even in the provinces of Owari and Mikawa, the seed of western provinces has been taken and cultivated, and the natural, long and soft stapled wool could be very rarely seen in the markets. Yet in the provinces of Hitachi and Shimatsuke, &c., where fine cotton goods are manufactured, the sort of cotton-plant producing long, soft, and strong stapled wool has long been cultivated after the old custom, but, unfortunately, as the interests for planters were gradually decreased on account of the lowering price of cotton of that sort, the custom of cultivating with the seeds of western province after the mode of cultivation in that part is increasing year by year.

Cotton-plants have different names in different provinces, so that it is difficult to distinguish them readily one from another, but it is believed that there are but three sorts, the so-called Kinai, Kanto, and Ainoko. The Kanto produces long, soft, and strong stapled wool ( $\frac{1}{2}$  inch to  $\frac{2}{3}$  inch in length), of glossy appearance, and contains 5 to 7 seeds in each cell, the size of which is large with less wool; and 3.2507 ounces of the seed cotton give .97521 ounce of ginned cotton. On the contrary, Kinai has hard and short stapled wool ( $\frac{1}{4}$  inch to  $\frac{1}{2}$  inch in length), of larger diameter and rather destitute of glossiness, and contains 8 to 11 seeds in each cell, of smaller size and covered with more wool, and 3.2507 ounces of the seed cotton yield 1.23526 ounces to 1.46281 ounces of ginned cotton. Ainoko is the result of a reciprocal acclimatization, viz, Kanto seeds (that is the seed of eastern part) being grown in Kinai district (middle part), and Kinai seeds in Kanto district, or Kinai seeds in Kiushiu (southwestern part), and Kiushiu seeds in Kinai; the properties, qualities, and lengths of the stapled wool of the former are intermediate between those of the two preceding, and those of the latter intergrade between those of the native cottons of Kinai and Kiushiu.

The mode of cultivation and manures are various according to both the soils and the climates, and also to the customs of every district. In Kinai district and the provinces of Owari, Mikawa, &c., cotton-planters like to have the cotton-plants rather short and thin instead of growing them tall and large, the rootlets spreading out fully, and in Kanto and some other districts they like to have the trunks of the plants grow tall and large, the primary root descending deeply in the ground; cultivators generally dislike the latter plan, and there is no doubt that such plants by no means give valuable returns. Agreeably to these views, it is thought that the fact that the cotton crop in Kanto could not be equal to that in Kinai is to some extent due to the mode of cultivation, which, in Kanto, has not attained great excellence; there is also the difference of the seeds.

Cottons to be presented ought to be collected for the purpose in cotton-producing districts, but in order to avoid losing time those specimens already collected from among the exhibits at the competitive exhibition of cotton and sugar, held at Osaka in last year (1880), are sent; therefore, the glossiness of the cotton-wool may be rather defective in comparison with that of the new crop.

**DESCRIPTION OF A NEW SPECIES OF XENICHTHYS (XENICHTHYS XENURUS) FROM THE WEST COAST OF CENTRAL AMERICA.**

**By DAVID S. JORDAN and CHARLES H. GILBERT.**

*Xenichthys xenurus*, sp. nov. (4356).

Allied to *Xenichthys californiensis* Steindachner; belonging to the group or subgenus, with the soft dorsal and anal short, not longer than the spinous dorsal.

Body rather deep, compressed; mouth very oblique; the maxillary barely reaching the vertical from the front of the pupil. Teeth in jaws small, in a band in front, which becomes a single series toward the sides; similar teeth on vomer, none on palatines or tongue.

Preorbital distinctly serrulate; preopercle evenly and finely serrate on the lower margin and on the angle, its upright edge entire above the angle; opercle terminating in two flat points. Eye very large, its diameter  $2\frac{3}{5}$  in head. Gill-rakers long and slender, about two-fifths the diameter of the eye, their number about  $9+24$ .

Lateral line with a slight curve in front, not quite concurrent with the back.

Spinous dorsal very high, the spines slender and somewhat flexible, the fifth and longest about two-thirds length of head; notch between spinous and soft parts deep. Anal spines rather stouter than those of the dorsal, the third longest, but little shorter than the first soft ray and two-thirds the longest dorsal spine. Caudal deeply forked, the lobes elongate, the middle rays but one third the length of the lower.

Pectorals two-fifths length of head. Ventrals barely reaching vent, their length equal to the distance from the snout to the posterior margin of orbit.

Base of caudal scaly; rest of the fin as well as the dorsals and anal naked, the scaly sheath of the dorsal and anal, leaving the last three rays free.

Head  $3\frac{1}{4}$  in length; depth  $2\frac{3}{5}$ . D. IX-I, 11; A. III, 11; Lat. l. 51.

Color olivaceous above; silvery below.

This species is known from one specimen (No. 4356 U. S. Nat. Mus.) sent to the United States National Museum from San Salvador, where it was taken several years ago by Capt. J. M. Dow. Its small number of fin rays distinguished it at once from *X. xanti* and *X. agassizii*, while from *X. californiensis* it differs in numerous respects.

INDIANA UNIVERSITY, November 22, 1881.

**LIST OF ANTHROPOLOGICAL PUBLICATIONS**

**BY CHARLES RAU.**

1859-1882.

- Die Gräber von Panama.** Relating to the discovery of gold figures in Chiriqui. In: *Die Natur*, herausgegeben von Dr. Otto Ule und Dr. Karl Müller von Halle. Vol. VIII, Halle, 1859, p. 372; illustrated.
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- Negeremancipation in Jamaika** (anonymous). Against sudden emancipation of negro slaves. In: *New-Yorker Staats-Zeitung*, June 14, 1862.
- An Account of the Aboriginal Inhabitants of the Californian Peninsula**, as given by Jacob Baegert, a German Jesuit Missionary, who lived there Seventeen Years during the Second Half of the Last Century. Translated and arranged for the Smithsonian Institution by Charles Rau. In: *Smithsonian Reports for 1863 and 1864*, pp. 352 and 378, respectively.
- Agricultural Implements of the North American Stone Period.** In: *Smithsonian Report for 1863*, p. 379; illustrated.
- Archäologisches aus der alten und neuen Welt.** Relating to pile-dwellings and artificial shell-deposits. In: *Die Natur*, Vol. XII, 1863, p. 110.
- Altindianische Industrie.** Ten illustrated articles. In: *Die Natur*, Vol. XII, 1863.
- Artificial Shell-deposits in New Jersey.** In: *Smithsonian Report for 1864*, p. 370; with illustration.
- Indian Pottery.** In: *Smithsonian Report for 1866*, p. 346; illustrated. Translated into French by M. Émile Cartailhac, under the title:—**Les Ustensiles en Argile des Indiens de l'Amérique du Nord.** In: *Matériaux pour l'Histoire Primitive et Naturelle de l'Homme*, Vol. V, Paris, 1869, p. 205; without illustrations. Reprinted in: *Flint Chips*, by E. T. Stevens; London, 1870, p. 245; without illustrations.
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- Ueber künstliche Muschelbetten in Amerika.** In: *Archiv für Anthropologie*, Vol. II, Braunschweig, 1867, p. 321; illustrated.
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- A Deposit of Agricultural Flint Implements in Southern Illinois.** In: *Smithsonian Report for 1868*, p. 401; illustrated. Translated into French by M. Émile Cartailhac, under the title:—**Trouvaille d'Outils Agricoles en Silex du Sud de l'Illinois.** In: *Matériaux*, etc., Vol. VI, 1870-71, p. 367; illustrations on Plate XIII.



- Die Thongefasse der nordamerikanischen Indianer.** In: *Archiv für Anthropologie*, Vol. III, 1868, p. 19; illustrated.
- Die durchbohrten Geräthe der Steinperiode.** In: *Archiv für Anthropologie*, Vol. III, 1868, p. 187; illustrated.
- Memoir of C. F. P. von Martius.** Partly ethnological in character. In: *Smithsonian Report for 1869*, p. 169.
- Steinerne Ackerbaugeräthe der nordamerikanischen Indianer.** In: *Archiv für Anthropologie*, Vol. IV, 1870, p. 1; illustrated.
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- Von Martius on Some Points of South American Ethnology.** In: *Journal of the Anthropological Institute of New York*, Vol. I, New York, 1871-'72, p. 43.
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- Die Jadeitgegenstände des National-Museums zu Washington.** In: Archiv für Anthropologie, Vol. XIV; illustrated. *In press.*
- Articles on Anthropological Subjects, contributed to the Annual Reports of the Smithsonian Institution from 1863 to 1877.** Washington, published by the Smithsonian Institution, 1882. 8<sup>o</sup>, pp. X, 169; illustrated (No. 440 of Smithsonian Publications).

**DESCRIPTION OF FIVE NEW SPECIES OF FISHES FROM MAZATLAN, MEXICO.**

**By DAVID S. JORDAN and CHARLES H. GILBERT.**

**Tylosurus sierrita**, sp. nov. (28162, 28365, 29227, 29377, 29378.)

Closely allied to *Tylosurus exilis* (Grd.).

Body very slender, not compressed; caudal peduncle depressed, half wider than deep, the lateral line forming a moderate keel, which is not black.

Jaws very long, slender, and fragile, as in *T. exilis*, *longirostris*, &c., the tip of the lower (as usual) projecting; length of upper jaw from eye  $2\frac{3}{4}$  times length of postorbital part of head, 9 times space between nostrils; maxillary scarcely reaching vertical from front of pupil, about half of its posterior portion slipping under the preorbital; preorbital small, not extending backward to tip of maxillary.

Teeth essentially as in *T. longirostris*; an outer band of small acute teeth in each jaw, and an inner series of long, sharp, slender teeth, 50 to 60 in each jaw; middle line of lower jaw in front of tongue with a band of rasp-like teeth; no teeth on vomer; no gill-rakers.

Eye large, contained  $2\frac{1}{2}$  times in postorbital part of head; interorbital region with a rather broad and deep, scaly groove, widest anteriorly and extending backward to opposite middle of cheeks; behind this, the middle part of the cranium is somewhat elevated and bounded by two longi-

tudinal ridges, which rise higher than the temporal ridges; this entire region nearly or quite destitute of scales [in *T. exilis* the middle of the top of the cranium is scarcely elevated and without longitudinal ridges, the whole region being more or less closely scaled]; scales of frontal region extending little forward of base of premaxillaries (in *T. exilis*, extending for more than one-fourth the length of the premaxillaries.) Cheeks well scaled; scales on opercle very minute.

Scales not very small, green.

Dorsal fin beginning and ending behind anal, its origin above base of fifth anal ray; anterior rays of both fins produced; median and posterior rays equal, the latter not reaching nearly to base of caudal; anal lobe higher than dorsal lobe, its height four-fifths length of postorbital part of head. Ventrals small, extending about one-third the distance to origin of anal, their insertion midway between base of median caudal rays and middle of cheeks. Pectorals broad, as long as postorbital part of head, the upper ray broad. Caudal lunate, the lower lobe the longer; the middle rays not quite twice as long as eye.

Head  $2\frac{1}{3}$  in length; depth nearly 18. D. 1, 16; A. 1, 17; P. 13; Lat. 1. ca. 250.

Color; green above; white below; a dusky dorsal stripe; a silvery lateral stripe; sides of head silvery; upper part of cheeks punctulate; body and fins without dark points; a blackish half-bar between cheeks and opercles; a blackish blotch above eye and one in front of nostrils. Fins olivaceous, all more or less dusky at tip. Posterior portion of pectorals abruptly black.

This species is abundant at Mazatlan, where it is one of the common market fishes. It reaches a length of about two feet, and it is known to the Mexican fishermen as "*Sierrita*."

It resembles its Californian representative, *Tylosurus exilis*, very closely, differing in several details, some of which are noticed above. The two species may be distinguished at sight by the color of the pectorals, which are, in *T. exilis*, plain olivaceous. The dorsal and anal lobes in the latter species are not dusky at tip.

## 2. *Tylosurus fodiator*, sp. nov. (28190, 28323.)

A species of large size, remarkable for the great strength of its jaws.

Body robust, subterete, as broad as deep; caudal peduncle slightly compressed, as deep or deeper than broad, the lateral line forming a low black cutaneous fold along its length.

Head very broad and strong, the cheeks nearly vertical. Interorbital space very broad, two-thirds length of postorbital part of head. Middle of top of head with a broad, shallow, nearly scaleless, longitudinal groove; sides of top of head obliquely striated and rugose, forming a prominent ridge above the eye; distance between nostrils greater than usual, more than one-sixth length of snout.

Jaws comparatively short, tapering, very stiff and not fragile; lower

jaw wider and longer than upper. Both jaws with broad bands of small rasp-like teeth, which extend as small roughnesses on the sides of the jaw; within these is a series of very large teeth, compressed and knife-shaped, much stronger than in most of the species of this genus. The length of one of these teeth is not more than three times its breadth; posterior teeth in both jaws directed backward, the anterior erect. Number of large teeth about  $\frac{30+30}{20+20}$ ; length of large teeth about one-sixth diameter of eye; no teeth on vomer. Teeth, scales, and probably bones, green. Gill-rakers obsolete.

Upper jaw, from eye, about half longer than rest of head. Eye large,  $6\frac{1}{2}$  in snout, 3 in postorbital part of head, and 2 in interorbital width. Only a narrow edge of the maxillary not covered by the preorbital. Cheeks closely sealed; opercles almost wholly naked. Scales extremely small.

Dorsal fin rather high in front, becoming low posteriorly, its longest rays two-fifths the length of its base, a little shorter than the postorbital part of the head. Caudal lunate, its lower lobe about one-third longer than the upper, the middle rays half longer than eye. Anal falcate, low posteriorly, its longest rays about equal to postorbital part of head.

Ventral fins long, inserted midway between middle of caudal base and middle of orbit, their length a little more than length of pectorals and equal to postorbital part of head; upper ray of pectorals broad, sharp-edged.

Head  $3\frac{3}{4}$  in length; depth 15. D. I, 19; A. I, 17; V. 6; P. 14; Lat. l. about 440.

Color green above, silvery below; fins somewhat dusky, except the anal, which is pale; cheeks and lower jaw silvery; middle line of back darker.

This species is abundant in the harbor of Mazatlan, where it is known to the fishermen as "*Aguja*." It is seldom brought to the market, as it is not considered a good food-fish. Its strong jaws are dreaded by the fishermen, who say that it is able to thrust through the bottom of a boat. The largest specimen obtained by Mr. Gilbert (No. 28190) was 43 inches in length, and has served particularly as the type of the present description. A smaller specimen is numbered 28323.

### 3. *Cynoscion xanthulum*, sp. nov. (28109.)

Body moderately slender, compressed; head rather long, compressed and pointed; caudal peduncle rather slender. Eye large, 6 in head; a fourth less than interorbital width, which is slightly less than length of snout. Maxillary broad and truncate, its tip as wide as eye and reaching to just beyond its posterior margin; length of maxillary a little less than half length of head; mouth moderately oblique, the lower jaw prominent; premaxillaries in front, below level of lower edge of eye. Band of teeth in front of lower jaw narrow, becoming a single series



laterally; the outer series of teeth in the upper jaw and the lateral series of teeth in the lower jaw larger than the others; upper jaw with two series of small teeth behind the outer series, and with two canines (sometimes but one), which are smaller than is usual in this genus. Gill-rakers rather short and strong, as long as pupil. Pseudo-branchiae present.

Scales small; lateral line well-arched in front, becoming straight opposite the vent. First dorsal high, the spines not very slender, the third spine a little less than half length of head, nearly equal to the fourth and not very much longer than the second; soft dorsal rather high, the longest rays  $2\frac{2}{3}$  in length of head, not scaly, but with a distinct high basal sheath. Caudal fin double concave, the middle rays considerably produced, their length about two-thirds that of head. Anal rather short and high, its longest ray two-thirds length of head, its spines small but rather stout. Ventrals a little more than half length of head, reaching about half way to vent. Pectorals  $1\frac{2}{3}$  in head, not quite reaching tips of ventrals.

Head,  $3\frac{1}{3}$  in length; depth,  $4\frac{1}{3}$ . D. IX-I, 20; A. II, 8; Lat. 1. 86 (vertical rows of scales, the number of pores about 66); about 12 rows of scales between front of dorsal and lateral line.

Bluish above, silvery below, upper parts and more conspicuously the middle of sides, punctate with dark points; upper fins dark, their margins dusky; lining of opercle black; peritoneum white; inside of mouth bright yellow in life.

This species has many points in common with *C. album* Gthr., but is readily distinguished by its much smaller scales (about 65 in *C. album*). It is very abundant at Mazatlan, where it is one of the most highly valued and most common food-fishes.

The type (28109) is 15 inches in length.

#### 4. *Culius æquidens*, sp. nov. (28268, 29240.)

Body elongate, depressed anteriorly, much slenderer than in *C. fuscus*, the head especially very broad and flat, longer and more depressed than in *C. fuscus*. Mouth large, broad, very oblique, the maxillary reaching nearly or quite to opposite posterior margin of eye: lower jaw considerably projecting. Length of maxillary  $2\frac{1}{3}$  in length of head. Teeth in jaws all equal, in broad bands, the outer not at all enlarged. Eye small, anterior, its length in the adult, equal to half the width of inter-orbital space, which is nearly one-third the length of head; a conspicuous knob at upper anterior and posterior angles of orbit; preopercular spine (as in all species of the genus) well developed, strong, compressed, directed downwards and forwards.

Scales on head very small, mostly cycloid, covering cheeks and opercles, and upper part of head to the eyes. Scales on body smaller and smoother than in most other species of the genus, those on belly much smaller than those on sides; scales on back and belly cycloid, only those on the sides of the body being distinctly ctenoid.



Pectoral fins moderate, reaching to near end of base of first dorsal,  $1\frac{2}{3}$  in head; ventrals inserted just behind axil, reaching half way to vent, and about half length of head. Interspace between dorsals about equal to diameter of eye. Soft dorsal and anal short and high, very similar, coterminous; last ray of anal a little more than half length of head. Caudal peduncle long, a little shorter than head. Caudal fin rounded,  $1\frac{1}{3}$  in head.

Head  $3\frac{1}{2}$  in length to base of caudal; greatest depth about 6.

D. VI—I, 8; A. I, 8; Lat. 1. 60; 24 scales in an oblique series from front of soft dorsal downward and backward to anal; about 20 in a vertical series.

Color, dark, dull, olivaceous brown, paler below; younger specimens mottled below with bluish and speckled with dark brown. Sides without longitudinal stripes. Fins dusky, all of them finely mottled and speckled with darker; the dark markings on dorsal and anal forming undulated longitudinal stripes; on pectorals and ventrals forming dark bars.

This species is known to us from three specimens, the longest about a foot in length. They were obtained from near Mazatlan; according to fishermen from fresh-water at Presidio.

*Culius aequidens* apparently differs from other species of the group in the large mouth with small equal teeth, and in the small smoothish scales.

*Culius belizanus*, lately described by M. Sauvage\* from Belize, is very similar, but has the teeth of the outer row enlarged.

5. *Centropomus robalito*, sp. nov. (28102, 28132, 28150, 28310, 28321, 29562, 29564.)

Allied to *Centropomus armatus* Gill; belonging to the division of the genus with large scales, and very large anal spine.

Body comparatively elongate, the back little elevated; profile from snout to base of dorsal more nearly straight than in most of the species; upper outline of head somewhat concave; nuchal region little gibbous. Mouth smaller than in *C. armatus*, the maxillary barely reaching the vertical line from the front of pupil (in *C. armatus* of the same size reaching past front of pupil), the gape contained nearly 3 times in length of head; snout long, longer than in *C. armatus*,  $3\frac{1}{2}$  in head; eye moderate, a little more than half length of snout; preorbital with strong retrorse serræ. Top of head narrower than in *C. armatus* and more strongly ridged; the two interior ridges on the interorbital space separated by a space little wider than the nostril, coalescing opposite the nostrils and forming a single ridge for a little distance forward to near the base of the spines of the premaxillary. Preopercle with rather distant teeth of nearly equal size on the entire length of its vertical margin; similar teeth on the horizontal part, growing larger backward; about two teeth at the angle much longer and stronger than the others.

\* Bull. Soc. Philom., Paris, 1879, 16 (reprint).

Suprascapula with five or six strong teeth. Opercular flap reaching about to front of spinous dorsal. Gill-rakers long, about two-thirds diameter of orbit.

Dorsal spines high and rather strong, but distinctly slenderer and more flexible than in *C. armatus*, their tips when depressed reaching considerably farther back than the tips of the pectorals or ventrals; third spine longest, a little less than half length of head; fourth spine but little shorter than third. Insertion of first dorsal spine a trifle nearer last ray of second dorsal than tip of snout. Second anal spine very long (slender and perfectly straight in two specimens, strong and curved in the others,) its tip about reaching base of caudal. It is much longer than third dorsal spine or than third anal spine, and is about  $1\frac{1}{2}$  in length of head. Third anal spine about equal to first soft ray. Caudal fin well forked. Ventral fins long, reaching in most cases scarcely to the vent. Pectorals about equalling ventrals,  $1\frac{2}{3}$  in length of head, not reaching tips of ventrals. Vent about midway between base of ventrals and middle of base of anal.

Scales large, those in front of dorsal not crowded, 10 to 14 in number (16 to 18 in *C. armatus*); 5 series between lateral line and front of spinous dorsal.

Head (with opercular flap)  $2\frac{2}{3}$  in length; depth  $3\frac{1}{2}$  ( $3\frac{1}{4}$  in *C. armatus*). D. VIII-I, 10; A. III, 6; scales, 5-51-9.

Color olivaceous, white below; lateral line pale. Membrane of anterior dorsal spines and of second and third anal spines blackish, as in *C. armatus*; pectorals and soft parts of vertical fins somewhat dusky; ventrals plain yellowish.

This species is rather common at Mazatlan, where numerous specimens were obtained. It reaches a length of about a foot, and is known to the fishermen as "*Constantino*" or "*Robalito*", the larger species of the genus, *C. undecimalis* and *C. nigreseens*, being called "*Robalo*".

Two specimens, 29228 from Mazatlan, and 28245 taken by Lieutenant Nichols at Acapulco, differ from the others in the following respects: The anal spine is shorter, slenderer, and perfectly straight, and the ventral fins are longer, reaching well past the vent, as in *C. armatus*.

INDIANA UNIVERSITY, December 2, 1881.

**NOTES ON A COLLECTION OF FISHES MADE BY CAPTAIN HENRY E. NICHOLS, U. S. N., IN BRITISH COLUMBIA AND SOUTHERN ALASKA, WITH DESCRIPTIONS OF NEW SPECIES AND A NEW GENUS (*Delolepis*).**

**By TABLETON H. BEAN.**

In the summer of 1881 Captain Nichols made a voyage in command of the United States Coast and Geodetic Survey steamer Hassler, through the inland waters of British Columbia and Southern Alaska, during which he preserved for the United States National Museum 31 species

of fishes, all of which were received in excellent condition. Although Captain Nichols made no special effort to obtain all the species occurring in the region traversed, he succeeded in making some very important additions to our knowledge of the fauna. *Hippoglossoides Jordani*, *Psettichthys melanostictus*, and *Xiphister mucosus* have not previously been known to occur north of Puget Sound. *Gymnacanthus galeatus* was recorded with certainty only from Unalashka. *Sebastodes paucispinis* has had San Francisco as its northern limit. A new species of *Gobius* was obtained in Departure Bay, and a scaled genus of *Cryptacanthidae* in Kingcombe Inlet, and at Wrangel. This goes to show what might be brought to light by a systematic search of the waters of Alaska.

It is due to Captain Nichols to say that no better-preserved lot of fishes has been received from any other collector.

1. *Hippoglossus vulgaris* Fleming.

29147 (120) juv. Sitka, Alaska, Sept. 13, 1881.

Length of specimen,  $11\frac{3}{5}$  inches. D. 103; A. 79, the last ray in each of these fins is double. The usual plumpness characteristic of Alaskan halibut is maintained.

2. *Hippoglossoides Jordani* Lockington.

29810 (90). Safety Cove, British Columbia, Aug. 4, 1881.

Length 14 inches. D. 99; A. 77, the last four rays of each of these fins being split. Teeth of upper jaw in two rows, the outer row having stronger teeth. Lower jaw with one row of teeth.

Taken in 16 fathoms of water. Not previously known to occur north of Puget Sound.

3. *Psettichthys melanostictus* Girard.

29809 (107). Wrangel, Alaska, Aug. 16, 1881.

Length  $12\frac{1}{2}$  inches. D. 81; A. 59. The first known instance of its capture in Alaska.

4. *Limanda aspera* (Pallas) Bean.

29146 (110). Wrangel, Alaska, Sept. 13, 1881.

A single example,  $6\frac{1}{5}$  inches long. On the eyed side are numerous small black blotches, involving the dorsal, anal, and caudal as well as the body. This species has the lemon color on the posterior part of the blind side just as in *L. ferruginea*. I have again compared *aspera* with *ferruginea*, and find that they are certainly congeneric.

5. *Pollachius chalcogrammus* (Pallas) Jordan & Gilbert.

29126 (82). Head of Kingcombe Inlet, Brit. Col., Aug. 2, 1881.

29127 (87). Head of Kingcombe Inlet, Brit. Col., Aug. 2, 1881.

29128 (104). Wrangel, Alaska, Aug. 17, 1881.

29126 is 10.7 inches long; 29127,  $11\frac{2}{3}$  inches; and 29128,  $11\frac{1}{3}$  inches. In these examples the eye is four-fifths as long as the snout. There are no traces of the pseudo stripes characteristic of the adult fish.

The first of these was caught in 18 fathoms, nearly fresh water.

6. *Gadus morrhua* Linn.

29124 (80) juv. Drew's Harbor, Brit. Col. July 27, 1881.

29125 (114) juv. Kygani Straits, Alaska. Sept. 1, 1881.

No. 29124 is 9.7 inches long; No. 29125 measures 9 inches. There are 19 gill-rakers on the first branchial arch, the longest of them scarcely more than one-third as long as the eye. The fish are entirely free from external parasites.

No. 29124 was taken in 12 fathoms.

DELOLEPIS, new genus, *Cryptacanthidae*.

Body anguilliform, moderately compressed from the vent backward; provided with small, cycloid, imbricated scales.

Vent nearly median; a small anal papilla.

Lateral line continuous, nearly straight, slightly above the middle of the body in front of the vent, median from vent backward; it consists of a series of open pores without prominent raised tubes.

Head oblong, subquadrangular, shallow concave on the vertex, naked, with the muciferous channels well developed. Snout short, obtuse. Nostrils single, tubular, close behind the intermaxillars, in a horizontal line with the middle of the eye. Eyes small, encroaching on the dorsal outline, somewhat more prominent than in *Cryptacanthodes*, separated by a moderately wide interspace and surrounded by a series of shallow pits. Mouth wide, oblique, terminal, the lower jaw projecting beyond the upper.

Lips fleshy. Intermaxillars slightly protractile, with two rows of small conical teeth, re-enforced by a few larger ones at the symphysis behind the inner row. Mandibular teeth uniserial, larger than the intermaxillar, a few additional ones at the symphysis. Vomer and palate armed with a few moderately large teeth. Tongue smooth, adherent. A few shallow pits in the under surface of the mandible, continued in a series on the posterior border of the preoperculum. Operculum unarmed.

Gill-openings wide, the membranes attached to a narrow isthmus, extending backward beyond the pectoral base, and without a projecting flap. Gills four, a wide slit behind the fourth; gill-rakers very short, obtuse, in moderate number. Pseudobranchiae.

Branchiostegal rays, 6.

Pectoral fins short, their bases almost vertically placed and entirely below the middle of the body.

Dorsal fin commencing over the upper angle of the gill-opening and



continuous with the caudal, composed entirely of spines, of which a few anterior ones are weak.

Anal fin commencing a little in front of the middle of total length, composed of a couple of spines and a large number of split rays, continuous with the caudal.

Caudal fin moderately long, pointed.

Ventrals absent.

Abdominal viscera as in *Cryptacanthodes*. The stomach is a simple straight sac. The intestine is short (three-fourths of total length in the typical species). Pyloric cæca few, short, not greatly unequal in size.

Type, *Delolepis virgatus* Bean.

The close resemblance of *Delolepis* to *Cryptacanthodes* will be at once observed. The two are nearly identical in every other respect save the dermal structure. The muciferous channels are more developed in *Cryptacanthodes*, but the arrangement is similar. *Delolepis* is, therefore, established as a distinct genus mainly on the single character of developed scales, a character which I consider of sufficient importance in this small family to serve as a basis of subdivision.

#### 7. *Delolepis virgatus*, new species.

Captain Nichols forwarded two fine specimens of the fish which is here described: one of them taken at the head of Kingcombe Inlet, British Columbia, in 18 fathoms of nearly fresh water, August 2, 1880 (numbered 86 in the collector's list and called "eel"); the other caught at Port Wrangel, Alaska, in the latter part of August, 1880 (numbered 111 in collector's list and called "eel"). These types are numbered 29149 and 29150 in the United States National Museum Fish Register. The smaller is 470 millimeters ( $18\frac{7}{10}$  inches) and the larger 795 millimeters ( $31\frac{3}{10}$  inches) in length.

The body is eel-shaped, moderately compressed and tapering in its second half; its greatest height, which is about midway between pectoral and vent, contained 11 times in total length and equal to greatest width of head; greatest width of body slightly exceeds length of upper jaw. Beginning at a short distance behind the origin of the dorsal fin small, oblong, cycloid scales, closely imbricated, cover a strip of the body along the region traversed by the lateral line; the scaled area gradually widens until, from the vent backward, the whole tail is covered except a very narrow strip along the dorsal and anal fin bases.

The length of the head to end of operculum is contained from 6 to  $6\frac{1}{2}$  times in total length; its width and depth are nearly equal. Width of interorbital area, measured on the bone, equals length of snout and one-third of length of lower jaw. The supramaxillary extends a little behind the eye; its length is contained 3 times in distance from snout to dorsal fin. The length of lower jaw is contained  $12\frac{1}{2}$  times in total length. The eye is one-half as long as the snout and one-eleventh as long as the head. The nostrils are placed immediately behind the upper lip and as far apart as the limits of the interorbital space.



The dorsal fin begins at a distance from the snout equal to twice the greatest depth of head, or just over the upper angle of the gill-opening. The first spine is half as long as the 71st, which is the longest of all. The fin is continuous with the caudal.

The two anal spines are of nearly equal length, being about one-third as long as the longest anal ray. The distance of anal from snout is 3 times distance of pectoral from snout.

The caudal is developed but connate with dorsal and anal; its length is contained from 10 times to  $12\frac{1}{2}$  times in total length.

The distance of pectoral from snout is contained  $6\frac{1}{2}$  times in total length. The length of pectoral equals one-third length of head to upper angle of gill-opening.

Body of the smaller type brownish yellow, top of head brown, lips and forehead dotted with dark brown, branchiostegal membrane and lower part of head whitish, a brown stripe along lateral line, another along the back nearer to dorsal fin than to lateral line, and a third indistinct one along anal base; vertical fins, with a dark margin, which becomes wider and involves almost the whole surface posteriorly; pectoral brownish, mingled with lighter; caudal mostly dark. In the larger example the general color is violet brown, the dotting and stripes are almost black, the dark margins of the vertical fins are absent except posteriorly, and there is less whitish color on the lower parts.

*List of specimens.*

29149 (86)—(type). Kingcombe Inlet, Brit. Col. Aug. 2, 1881.

29150 (111)—(type). Wrangel, Alaska. Aug. 2, 1881.

The first was caught at the head of the inlet, in nearly fresh water, 18 fathoms.

MEASUREMENTS.

Species: *Delolepis virgatus*.

Current number of specimen.....	29149 (86)		29150 (111)	
Locality .....	Kingcombe Inlet, British Col.		Port Wrangel, Alaska.	
	Milli- meters.	100ths of length.	Milli- meters.	100ths of length.
Extreme length.....	470		795	
Length to end of middle caudal rays.....	470	100	795	100
Body.				
Greatest height.....	43	9	77	9.7
Greatest width.....	32	7	60	7.67
Height at pectoral.....	36	7.66	73	9.18
Height at anus.....	37	8	67	8.43
Head.				
Greatest length.....	78	16.6	126	15.85
Distance from snout to nape.....	51	10.8	89	11.2
Greatest width.....	42	9	78	9.81
Greatest depth.....	40	8.5	71	9
Width of interorbital area on the bone.....	13	2.77	22	2.76
Length of snout.....	13	2.77	21	2.64
Length of operculum.....	23	5	38	4.78
Length of supra-maxillary.....	27	5.74	50	6.20
Length of upper jaw.....	30	6.38	55	7
Length of mandible.....	38	8	64	8
Distance from snout to orbit.....	15	3.19	25	3.14
Diameter of orbit.....	7	1.5	11	1.38

## Measurements—Continued.

	Milli- meters.	100ths of length.	Milli- meters.	100ths of length.
Dorsal ( <i>spinous</i> ).				
Distance from snout .....	80	17	148	18.6
Length of longest spine (71st) .....	19	4	29	3.64
Length of first spine .....	10	2.13	16	2
Length of last spine .....	18	3.83	25	3.14
Anal.				
Distance from snout .....	217	46	386	48.55
Length of first spine .....	8	1.7	13	1.63
Length of second spine .....	9	1.91	16	2
Length of first ray .....	15	3.19	21	2.64
Length of longest ray (45th) .....	27	5.74	37	4.65
Length of last ray .....	21	4.5	31	4
Caudal.				
Length of middle rays .....	47	10	64	8
Pectoral.				
Distance from snout .....	74	15.33	125	15.72
Length .....	28	6	43	5.4
Branchiostegals .....	vi		vi	
Dorsal .....	lxxvii		lxxv	
Anal .....	II, 47		II, 46	
Pectoral .....	13		14	
Number of caecal appendages .....	6			
Length of longest appendage .....	35			
Length of shortest appendage .....	15			
Length of intestine .....	360			

8. *Lumpenus anguillaris* (Pallas) Girard.

29801 (112). Wrangel, Alaska. Aug. —, 1881.

29801 (122). Sitka, Alaska. Sept. 13, 1881.

Length of first, 11 inches; of second exactly the same. Vomer with out trace of teeth.

9. *Xiphister mucosus* (Girard) Jordan.

29815 (113). Wrangel, Alaska. Aug. —, 1881.

Two examples  $7\frac{1}{2}$  to 8 inches long. D. LXXVI; A. 49–50. In these specimens, which I have provisionally referred to *mucosus*, the occiput is equidistant from snout and dorsal; the anal origin is a little nearer the snout than the tip of caudal; the dorsal spines and anal rays are as in *X. rupestris*; the pectoral is as long as the eye. There is, consequently, a little difficulty in deciding what are the closest affinities of the examples here considered. A re-examination of all the Alaskan specimens of *X. rupestris* (so called in my preliminary catalogue, published Dec. 24, 1881) reveals a similar intermingling of the characters of *rupestris* and *mucosus* to some extent.

10. *Anoplarchus atropurpureus* (Kittlitz) Gill.

30221 (96). Port McLaughlin, Brit. Col. Aug. 6, 1881.

29814 (113). Wrangel, Alaska. Aug. —, 1881.

No. 30221, two specimens, found on the beach at low water. No. 29814 includes six individuals, of which the largest two were  $4\frac{1}{2}$  and  $5\frac{2}{5}$  inches long, respectively, with the following fin rays: smaller, D. 57, A. 40; larger, D. 55, A. 40.

I have examined many Alaskan specimens of *Anoplarchus* without finding one that has as many spines and anal rays as *A. alectrolophus* (Pallas) Jor. & Gilb.

11. *Muraenoides ornatus* (Girard) Gill.

29813 (113). Wrangel, Alaska. Aug. —, 1881.

Ten individuals varying in length from  $3\frac{1}{5}$  to  $7\frac{1}{5}$  inches. The largest has the following radial formula; D. 87; A. II, 38.

12. *Gobius Nicholsii*, new species.

The type of the present description (catalogue number 29803, collector's number 78) was secured by Captain Nichols at Departure Bay, British Columbia, July 26, 1881. It was found at a depth of 20 fathoms.

The species is closely related to *Coryphopterus glaucofrænum* Gill but differs from this in (1) its radial formula, (2) relative proportions, and (3) coloration.

The extreme length of the single typical specimen is 112 millimeters (four and two-fifths inches).

The body is stout, compressed, its greatest height under the middle of the spinous dorsal contained 6 times in the extreme length given above. The least height of the tail is about equal to the greatest width of body. The length of caudal peduncle equals nearly one and one-half times its height.

Head scaleless, nape showing mere traces of undeveloped scales. The width of head exceeds its greatest depth and equals two-thirds of its length. The length of head is contained four and two-thirds times in extreme length. The eyes are separated by a narrow interspace equal to one half of their long diameter. The obtuse, declivous snout is about as long as the eye. Nostrils double, not tubular, close together near eye, in a line with pupil. The intermaxillaries are slightly protractile downward. The upper jaw extends to the vertical through the anterior edge of pupil; the mandible, to below middle of pupil. The eye is one-fourth as long as the head. On the vertex and nape there is an inconspicuous median fold of skin simulating a crest. The lower jaw protrudes very slightly. Teeth in the jaws slender, conical, slightly recurved, pluriserial, the outer series somewhat enlarged; no canines. Gill-openings separated by a wide isthmus.

Distance of spinous dorsal from snout equals twice length of its base, and, also, twice height of body at ventrals. The first spine equals one-half length of head. The second spine is one-half as long as base of second dorsal. The last spine is as long as lower jaw. The dorsals are separated by a very small space, scarcely equal to that between the eyes. The last two rays of the soft dorsal are almost as long as head and more than twice as long as the first ray.

The vent is midway between end of snout and origin of middle caudal

rays. Anal papilla one-half as long as eye and equal to interorbital distance. The anal is similar to the soft dorsal in form and is apparently made up of rays only, the first of which is one-third as long as the last and the last but one. The last anal ray is five-sixths as long as head; it extends backward to a vertical through origin of middle caudal rays, while the last dorsal ray extends beyond this line. The anal ends slightly in advance of the end of soft dorsal.

Caudal convex behind (imperfect in the typical example), nearly as long as the head.

The middle pectoral rays are longest, about equal to length of head. None of the pectoral rays are free and silk-like.

The ventral originates immediately beneath the pectoral origin and does not reach to vent; its length equals greatest height of body (three-fourths length of head).

Br. v; D. VI,  $13\frac{1}{2}$ ; A.  $11\frac{1}{2}$ ; C. 13 (developed); P. 20; v. i, 5; L. lat. 26; L. trans. 10.

*Colors.*—Top of spinous dorsal black. Second dorsal and caudal spotted with dark color. Anal with some traces of dark color on its first half. Ventrals black. Body and tail olivaceous, a broad dusky margin on all the scales. Head colored like body but cheeks dusky and traces of purplish on side of snout.

Dedicated to Capt. Henry E. Nichols, U. S. N.

#### MEASUREMENTS.

Species: *Gobius Nicholsii*.

Current number of specimen .....	29803.
Locality .....	{ Departure Bay, British Columbia.
	Millimeters.
Extreme length .....	About 112
Length to origin of middle caudal rays .....	90
Body:	
Greatest height .....	19
Greatest width .....	12
Height at ventrals .....	15
Least height of tail .....	11
Length of caudal peduncle .....	15
Head:	
Greatest length .....	24
Greatest width .....	16
Width of interorbital area .....	3
Length of snout .....	5
Length of operculum .....	7
Length of maxillary .....	8
Length of intermaxillary .....	8
Length of mandible .....	10
Long diameter of eye .....	6
Short diameter of eye .....	5
Dorsal (spinous):	
Distance from snout .....	29
Length of base .....	14
Length of first spine .....	12
Length of second spine .....	13
Length of last spine (6th) .....	10
(soft):	
Length of base .....	26
Length of first ray .....	10
Length of longest rays (13th and 14th) .....	23
Length of last ray .....	23

## MEASUREMENTS—Continued.

	Millimeters.
<b>Anal:</b>	
Distance from snout .....	51
Length of base .....	19
Distance of vent from snout .....	49
Length of first ray .....	7
Length of longest ray (11th) .....	21
Length of last ray .....	20
<b>Caudal:</b>	
Length of middle rays .....	About 22
<b>Pectoral:</b>	
Distance from snout .....	25
Length .....	23
<b>Ventral:</b>	
Distance from snout .....	26
Length .....	19
<b>Branchiostegals</b> .....	V
<b>Dorsal</b> .....	VI, 13½
<b>Anal</b> .....	12
<b>Caudal</b> .....	+13+
<b>Pectoral</b> .....	20
<b>Ventral</b> .....	1, 5
Number of scales in lateral line .....	26
Number of transverse rows above lateral line .....	} 10
Number of transverse rows below lateral line .....	

13. *Cottus polyacanthocephalus* Pallas.

29139 (84). Head of Kingeombe Inlet, Brit. Col. Aug. 2, 1881.

29140 (94). Port McLaughlin, Brit. Col. Aug. 5, 1881.

29141 (98). Port Simpson, Brit. Col. Aug. —, 1881.

29142 (106.) Wrangel, Alaska. Aug. —, 1881.

29139.—Length  $4\frac{3}{10}$  inches. D. X, 13; A. 12; found in 18 fathoms, nearly fresh water.

29140.—Length  $12\frac{3}{10}$  inches. D. X, 14; A. 12; in 14 fathoms of water.

29141.—Length  $12\frac{1}{4}$  inches. D. X, 14; A. 11; in 14 fathoms. The middle preopercular spine of the right side is distinctly bifid, as a result, no doubt, of some early injury. This species sometimes has two, but usually three, developed preopercular spines.

29142.—Length 6 inches. D. IX, 14; A. 12.

14. *Gymnacanthus galeatus* Bean.

29144 (102) ♂. Chacan, Alaska. Aug. 15, 1881.

29145 (116). Sitka, Alaska. Sept. 13, 1881.

The first of these is  $8\frac{1}{10}$  inches long and bears out the characters of the species fully as to armature of head, depth of body about half length of head, &c. D. XI, 16; A. 18. Ventral reaches to third anal ray. From 10 fathoms of water.

The smaller individual is  $4\frac{2}{10}$  inches long, and also has the characters of the adult.

15. *Artedius notospilotus* Girard.

29143 (80). Drew's Harbor, Brit. Col. July 27, 1881.

Length 5 inches. D. IX, 17; A. 13; V. I, 3. Caught in 12 fathoms.



16. *Hemilepidotus trachurus* (Pallas) Günther.

29138 (117). Sitka, Alaska. Sept. 13, 1881.

A single example 12 inches long. D. III + VIII, 18 $\frac{1}{2}$ ; V. I, 4. Four rows of scales in dorsal band.

17. *Oligocottus maculosus* Girard.

29816 (113). Wrangel, Alaska. Aug. —, 1881.

There are two examples, the larger measuring 3 $\frac{1}{10}$  inches, the smaller 2 $\frac{7}{10}$  inches. The fin rays of both are alike: D. VIII, 17; A. 13. The first dorsal is only two-thirds as high as the second. The preopercular spine is bifid, with hooks incurved.

18. *Sebastichthys maliger* Jordan & Gilbert.

29130 (93). Port McLaughlin, Brit. Col. Aug. 5, 1881.

A large example 15 inches long and 5 inches deep. D. XII, I, 13; A. III, 7. The abdominal cavity is well supplied with tape-worm-like entozoa. The fifth dorsal spine has been broken off, so that it is little longer than the second, yet it has acquired a remarkably sharp point. This specimen is *very* much like an overgrown *caurinus*, yet it has the characters ascribed to *maliger*. Caught in 14 fathoms of water.

19. *Sebastichthys caurinus* (Rich.) Jordan & Gilbert.

29807 (77) (juv.). Departure Bay, Brit. Col. July 26, 1881.

29806 (124) (juv.). Rose Harbor, Queen Charlotte Island. Sept. 18, 1881.

29808 (103) (juv.). Chacm, Alaska. Aug. 16, 1881.

The smallest (No. 29808) is probably young *melanops*; it is 4 $\frac{7}{10}$  inches long and has the following fin rays: D. XII, I, 15; A. III, 8. These individuals measure 4 $\frac{1}{5}$ , 6 $\frac{1}{2}$ , and 6 $\frac{7}{10}$  inches respectively; their fin rays are: D. XII, I, 12, A. III, 6; D. XII, I, 13, A. III, 6; D. XII, I, 13, A. III, 7. Number 29807 includes 2 specimens taken in 20 fathoms.

20. *Sebastichthys ruber* (Ayres) Lockington.

29129 (115). Kygan Strait, Alaska. Sept. 1, 1881.

Length of the single specimen, 19 inches. D. XII, I, 16; A. III, 8. The mandibular knob projects  $\frac{3}{10}$  of an inch forward. The longest gill-rakers are nearly one inch long, equal to the distance between the anterior pair of nostrils. There are 36 rakers on the first arch, some of them distinctly club-shaped.

21. *Sebastes paucispinis* (Ayres) Gill.

29131 (95). Port McLaughlin, Brit. Col. Aug. 6, 1881.

Length 14 $\frac{3}{4}$  inches. D. XIII, I, 14; A. III, 7; V. I, 5. Caught in 14 fathoms of water.

22. *Hexagrammus asper* Steller.

29133 (97). Near Port Simpson, Brit. Col. Aug., 1881.

Length of specimen, 10 inches. The uppermost lateral line extends to the 17th dorsal spine. D. XXIII, 21; A. 24.

Captain Nichols catalogues this as from a fresh-water lake near Port Simpson.

23. *Hexagrammus superciliosus* (Pallas) Jordan & Gilbert.

29132 (125). Rose Harbor, Queen Charlotte Island. Sept. 18, 1881.

Length of specimen,  $12\frac{1}{2}$  inches. A brilliantly colored individual, with black, white, crimson, and brown finely contrasted. Scales decidedly ctenoid (!) except on head and pectoral bases.

24. *Hexagrammus decagrammus* (Pallas) Jordan & Gilbert.

29134 (118). Sitka, Alaska. Sept. 13, 1881.

29135 (126). Nootka Sound, Vancouver Island. Sept. 13, 1881.

29136 (127). Nootka Sound, Vancouver Island. Sept. 13, 1881.

29137 (129). Nootka Sound, Vancouver Island. Sept. 13, 1881.

29134 ♂ 13 inches long; 29135 ♂  $11\frac{1}{5}$  inches long; 29136 ♀ 9 inches long; 29137 ♀  $12\frac{1}{4}$  inches long. The last three were caught in Friendly Cove.

25. *Anoplopoma fimbria* (Pallas) Gill.

29117 (99). Port Simpson, Brit. Col. Aug. —, 1881.

29118 (83). Head of Kingcombe Inlet, Brit. Col. Aug. 2, 1881.

29119 (105). Wrangel, Alaska. Aug. 17, 1881.

29117 is  $14\frac{1}{2}$  inches long; 1 D. 19; 2 D. 17; A. 18; top of second dorsal and tips of caudal white. Caught in 14 fathoms of water.

29118 measures  $13\frac{1}{4}$  inches; 1 D. 19; 2 D. 19; A. 19; 18 fathoms, nearly fresh water. 29119 is  $17\frac{3}{4}$  inches long; 1 D. 21; 2 D. 17; A. 18.

26. *Damalichthys argyrosomus* (Girard) Jordan & Gilbert.

29811 (128). Friendly Cove, Nootka Sound, Vancouver Island. 1881.

Fourteen inches long; D. X, 22; A. 29; L. lat., 66; L. transverse, 7 + 17.

27. *Mallotus villosus* (Müller) Cuv.

29812 (123). Sitka, Alaska. Sept. 13, 1881.

There are 12 specimens of this species ranging from about 4 inches to  $4\frac{1}{2}$  inches in length. One individual examined had: D. 14; A. 24; V. 8; P. 18.

28. *Salvelinus malma* (Walb.) Jordan & Gilbert.

29148 (100). Near Port Simpson, Brit. Col. Aug. —, 1881.

A very plump specimen, one foot in length, taken from a fresh-water lake near Port Simpson. No external parasites are present.

29. *Chimæra Colliciei* Bennett.

29123 (91). ♂. Safety Cove, Brit. Col. Aug. 4, 1881.  
Length, 19 inches.

30. *Raia binoculata* Girard.

29805 (92). (Head.) Safety Cove, Brit. Col. Aug. 4, 1881.

29804 (108). (Head.) Wrangel, Alaska. Aug. —, 1881.

Teeth of first,  $\frac{4\frac{1}{2}}{4\frac{1}{2}}$ ; of second,  $\frac{4\frac{7}{8}}{4\frac{7}{8}}$ . The second is a much larger individual than the first. The first was caught in 16 fathoms.

31. *Squalus acanthias* Linn.

29121 (79). ♂. Drew's Harbor, Brit. Col. July 27, 1881.

29122 (81). ♂. Menzie's Bay, Brit. Col. July 31, 1881.

29120 (101). ♀. Red Bay, Alaska. Aug. 14, 1881.

Length of 29121 is  $2\frac{1}{2}$  feet. No. 29122 is  $24\frac{1}{2}$  inches long. 29120 is 29 inches long. The snout of the female is more obtuse than in the two males. All of these specimens have a low keel along the lower margin of the caudal peduncle from the end of the second dorsal to the root of the caudal, just as in Atlantic specimens.

These three dogfish were caught in 12, 5, and 12 fathoms, respectively.

UNITED STATES NATIONAL MUSEUM,

January 31, 1882.

ON THE RARE RODENT, *CRICETODIPUS PARVUS* (BAIRD) COUES.

BY FREDERICK W. TRUE.

At the time when Dr. Elliott Coues published his valuable monograph of the Saccomyidæ\* the United States National Museum possessed but four specimens of the species *Cricetodipus parvus* Baird—two of them in bad condition—including the single type-specimen of Professor Baird. On account of this scarcity of material he was forced to speak very cautiously regarding the animal, leaving it uncertain whether it was a distinct species or merely a variety of *C. flavus* Baird.

In an interesting collection of rodents in alcohol, recently received into the Museum from Mr. Gustav Eisen, of Fresno, Cal., I found nine additional specimens of this doubtful species, seven of which are in perfect condition. A careful examination of these has convinced me that *C. parvus* is a distinct species. The averages at the bottom of the following table of measurements, compared with those given by Dr. Coues for *C. flavus*,† bring out, I think, very clearly the characteristic differences of the two species.

\* Coues. Report, U. S. Geol. Surv. of the Territories, xi, 1877. Monograph VIII, pp. 481-542.

† Coues, l. c., p. 518.

*Actual measurements in inches of six specimens of Cricetodipus parvus (Baird) Coues.*

Catalogue number.	Locality.	Distance from tip of nose to—				Tail, base to end of vertebrae.	Length of fore-foot.	Length of hind-foot.
		Eye.	Ear.	Occiput.	Base of tail.			
13401	Fresno, Cal. ....	.50	.80	1.10	2.50	2.80	.30	.73
13394	.....do .....	.45	.70	1.00	2.40	2.80	.30	.72
13396	.....do .....	.50	.70	1.00	2.10	2.70	.30	.75
13397	.....do .....	.50	.75	1.05	2.10	2.60	.31	.70
13398	.....do .....	.45	.70	1.00	2.20	2.75	.30	.75
13399	.....do .....	.45	.70	1.00	2.15	2.50	.30	.70
	Average.....	0.475	0.725	1.03	2.24	2.68	0.302	0.722
	Average given by Dr. Coues for eighteen specimens of <i>C. flavus</i>	0.42	0.74	0.90	2.07	2.06	0.30	0.63

If this table be examined, it will be perceived that in *C. parvus* (1) the head is longer by one-tenth inch than in *C. flavus*, and that (2) the eye is decidedly nearer the ear in the former species than in the latter. Furthermore, it appears that in *C. parvus* (3) the tail is always longer than the head and body, averaging about half an inch more; and that (4) the length of the hind-foot approximates closely to one-third that of the head and body, sometimes exceeding one-third. The hind-foot of *C. parvus* it will be observed does not average quite as much as Dr. Coues was led to suppose; nevertheless, it is longer than in *C. flavus*.

There is another character, which, unless I am very much deceived, will make it an easy matter to distinguish the two species from each other; I refer to the colors of the hair. In parting the hair of a specimen of *C. flavus*, along the center of the dorsal surface, from near the tip of the nose to the base of the tail, it will be seen, as Professor Baird has already observed,\* that the basal portion of the hair, nearly two-thirds, is everywhere of a clear lead-color, a portion above, not as wide, buff, and the tip dusky. In *C. parvus* a decidedly different distribution obtains. The majority of the hairs of the top of the head are light buff from immediately below the tip almost or quite to the base; a smaller proportion are dusky throughout, darkest at the tip. On the neck the plumbeous color is discernible at the base of the hairs, but does not occupy more than about one-half of the total length. Posteriorly the proportion of lead-color diminishes rapidly, so that about the base of the tail it is barely perceptible, or may be said to have disappeared entirely. The tail is distinctly bicolor. The hair of *C. parvus* is coarser than that of the Yellow Pocketmouse, more inclined to be hispid, and shorter, measuring scarcely more than one-quarter of an inch at the middle of the back. In general color but little difference is observable between the two species, but when the hair is disarranged the former species appears more strongly fulvous than *C. flavus*, on account of the lack of lead-color at the base of the hairs.

\* Baird. Mammals, Pacific R. R. Survey, viii, 1857, p. 424.





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## APPENDIX.

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SMITHSONIAN INSTITUTION.

UNITED STATES NATIONAL MUSEUM.

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No. 1.

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**PLAN OF ORGANIZATION AND REGULATIONS.**

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WASHINGTON, *October 1, 1881.*

SIR: In compliance with your request, I have prepared a code of regulations for use in the National Museum, which I herewith submit to you for your criticism.

They are in large part merely formulations of the unwritten laws and usages which have guided the officers of the Museum in past years, and which have now become so numerous and complicated that it has seemed necessary to reduce them to some tangible form.

To the code of rules has been prefixed a brief statement of the scope and aims of the Museum, as already defined by yourself in the reports of the Smithsonian Institution and elsewhere.

I am, sir, yours very respectfully,

G. BROWN GOODE,  
*Assistant Director.*

Prof. SPENCER F. BAIRD,  
*Director National Museum.*

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[General Order No. 3.]

UNITED STATES NATIONAL MUSEUM,  
*Washington, October 15, 1881.*

The accompanying code is adopted for the government of the National Museum, and for the regulation of the operations of its officers and employees.

All the provisions of former general orders are hereby annulled, and the provisions of the present code will hold in force unless they are expressly changed by future general orders.

Officers and employees are requested to become familiar with its provisions, and to aid in carrying them out.

SPENCER F. BAIRD,  
*Director U. S. National Museum.*



# ORGANIZATION AND ADMINISTRATION

## OF THE

# UNITED STATES NATIONAL MUSEUM.

JANUARY 1, 1882.

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# ORGANIZATION OF THE U. S. NATIONAL MUSEUM.

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## FOUNDATION AND SCOPE.

### I.

THE NATIONAL MUSEUM was organized in 1846 by the act of Congress transferring to the SMITHSONIAN INSTITUTION the custody of the "National Cabinet of Curiosities," at that time deposited in the Patent-Office Building.\* These collections were, in 1857, placed in the Smithsonian building, the Regents of the Institution having accepted the trust on condition that the necessary appropriations for their maintenance should be continued by Congress.

### II.

The act above referred to provides that "all objects of art and of foreign and curious research, and all objects of natural history, plants, and geological and mineralogical specimens belonging or hereafter to belong to the United States, which may be in the city of Washington," shall be delivered to the Regents of the Smithsonian Institution, and, together with new specimens obtained by exchange, donation, or otherwise, shall be so arranged and classified as best to facilitate their examination and study.†

The National Museum is the authorized place of deposit for all objects of natural history, mineralogy, geology, archeology, ethnology, &c., belonging to the United States or collected by the Coast and Interior Survey, the Geological Survey, or by any other parties for the Government of the United States, when no longer needed for investigations in progress.‡

### III.

The ESTABLISHMENT of the Smithsonian Institution, to which, in addition to the carrying out of the other requirements of the bequest of Smithson, is entrusted the control of the National Museum, is composed

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\* AN ACT to establish the "Smithsonian Institution" for the increase and diffusion of useful knowledge among men. (Approved August 10, 1846; Revised Statutes, title lxxiii, sections 5579-5594.)

† Revised Statutes, section 5586.

‡ Statutes Forty-fifth Congress, third session, chap. 182, p. 394.

of the President of the United States and his Cabinet, the Commissioner of Patents, and a BOARD OF REGENTS, which has for its members the Vice President and Chief Justice of the United States, three members of the Senate, three members of the House of Representatives, and six other persons, not members of Congress, two of whom are residents of the city of Washington.\*

#### IV.

The management of the National Museum is entrusted to the Secretary of the Smithsonian Institution, who is, *ex officio*, its director. He is aided by a staff of assistants, who are chosen by him, and for whose action he is responsible to the Regents.

#### V.

The operations of the Museum are carried on by means of an appropriation annually made by Congress "for the care and preservation of the collections."

#### VI.

The collections are stored and exhibited in the building erected for the use of the Smithsonian Institution between 1847 and 1857, and in the new building, just finished, known as the "National Museum."

#### VII.

The Museum is made up, in large part, of the following materials:

1. The natural-history and anthropological collections accumulated since 1850 by the efforts of the officers and correspondents of the Smithsonian Institution.

2. The collections of the Wilkes Exploring Expedition, the Perry Expedition to Japan, and other naval expeditions.

3. The collections of the scientific officers of the Pacific Railroad Survey, the Mexican Boundary Survey, and of the surveys carried on by the Engineer Corps of the Army.

4. The collections of the United States Geological Surveys under the direction of United States Geologists Hayden, King, and Powell.

5. The collections of the United States Fish Commission.

6. The gifts by foreign governments to the Museum or to the President and other public officers of the United States, who are forbidden by law to receive them personally.

7. The collections made by the United States to illustrate the animal and mineral resources, the fisheries, and the ethnology of the native races of the country, on the occasion of the International Exhibition at Philadelphia in 1876, and the fishery collections displayed by the United States in the International Fishery Exhibition at Berlin in 1880.

8. The collections given by the governments of the several foreign

nations, thirty in number, which participated in the exhibition at Philadelphia.

9. The industrial collections given by numerous manufacturing and commercial houses of Europe and America, at the time of the Philadelphia Exhibition and subsequently.

10. The material received, in exchange for duplicate specimens, from the museums of Europe, Asia, and Australasia, and from numerous institutions and collectors in North and South America.

### VIII.

As necessary adjuncts to the work of the Museum, a working library, a chemical laboratory, a photographic establishment, a workshop for taxidermy, modeling, and the preparation of skeletons, and several smaller workshops are carried on as a part of the general work of administration.

### IX.

The scientific results of the labors of the officers of the Museum, and of investigations upon the collections belonging to it, are to be found for the most part in the following works:

*Bulletin of the United States National Museum*; the *Proceedings of the United States National Museum*; the *Reports of the Smithsonian Institution*; the *Smithsonian Miscellaneous Collections*; the *Smithsonian Contributions to Knowledge*; the *Reports of the Bureau of Ethnology of the Smithsonian Institution*; and in the *Reports of the United States Commissioner of Fisheries*; and the *Bulletin of the United States Fish Commission*; also occasionally in other scientific reports of other scientific departments of the government.

## FUNCTION AND AIMS OF THE MUSEUM.

### X.

The collections in the National Museum are intended to exhibit the natural and industrial resources, primarily of the United States, and secondarily of those of the remainder of the world, for purposes of comparison.

### XI.

The activity of the Museum is exerted in three directions:

- (a) The permanent preservation of objects already in its possession.
- (b) The acquisition of new material.
- (c) The utilization of material already in its possession, by its exhibition in the most instructive manner, and by the prosecution of and publication of scientific researches for which it forms the basis; by the distribution of properly-labeled duplicates of materials to colleges and other educational institutions.

The preservation of material is accomplished by means of the vigilance of the curators and the skill of the preparators.

## XII.

New material is acquired (*a*) in accordance with law, from the various government surveys and expeditions; (*b*) by gift from individuals, from other institutions, and from foreign governments; (*c*) by exchange for its duplicate specimens or publications; (*d*) by the efforts of officers of the Museum, who make collections in connection with their regular duties, or are detailed for special service of this nature; (*e*) by purchase, when appropriations are made by Congress for that purpose.

## XIII.

The treasures in the custody of the Museum are utilized to the world by exhibiting them to the public, and by encouraging investigations on the part of the officers of the Museum and other suitable persons, and facilitating the publication of the results; also by the distribution to other museums and educational institutions of duplicate specimens, which have formed the basis of scientific investigation, these being identified and labeled by the best authorities.

## XIV.

The Museum by these means fulfills a threefold function:

1. It is a *Museum of Record*, in which are preserved the material foundations of an enormous amount of scientific knowledge—the types of numerous past investigations. This is especially the case with those materials which have served as a foundation for the reports upon the resources of the United States. Types of investigations made outside of the Museum are also incorporated.

2. It is a *Museum of Research*, by reason of the policy which aims to make its contents serve as fully as possible as a stimulus to and a foundation for the studies of scientific investigators. Research is necessary in order to identify and group the objects in the most philosophical and instructive relations. Its officers are selected for their ability as investigators, as well as for their trustworthiness and abilities as custodians, and its treasures are open to the use of any honest student.

3. It is an *Educational Museum* of the broadest type, by reason of its policy of illustrating by specimens every kind of natural object and every manifestation of human thought and activity, by displaying descriptive labels adapted to the popular mind, and by its policy of distributing its publications and its named series of duplicates.



**CLASSIFICATION OF THE DEPARTMENTS.****XV.**

The following classification of the collections has been provisionally adopted:\*

## Division of Anthropology.

Department I.—Art and Industry.

Department II.—Races of men.

Department III.—Antiquities.

## Division of Zoology.

Department IV.—Mammals.

Department V.—Birds.

Department VI.—Reptiles and Batrachians.

Department VII.—Fishes.

Department VIII.—Mollusks.

Department IX.—Insects.

Department X.—Crustaceans.

Department XI.—Worms.

Department XII.—Radiates and Protozoans.

Department XIII.—Invertebrate Fossils.

## Division of Botany.

Department XIV.—Recent Plants.

Department XV.—Fossil Plants.

## Division of Geology.

Department XVI.—Physical Geology.

Department XVII.—Minerals and Rocks.

Department XVIII.—Metallurgy and Economic Geology.

## Division of Exploration and Experiment.

Department XIX.—Exploration and Field work.

Department XX.—Chemistry.

Department XXI.—Experimental Physiology.

Department XXII.—Vivaria.

To these divisions is added a sixth, the

## Division of Administration.

Department A.—Direction.

(Supervision of routine work; Installation and labeling; Apartments and keys; Cases and furniture; Supplies; Offers, bids, and contracts; Certification of accounts; Requisitions and complaints; Assignments of work—leaves of absence; General correspondence and circulars; Supervision of other departments in division of administration; Reports.)

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\* This classification is founded solely upon considerations of present convenience in Museum administration.

## Department B.—Registry and Storage.

(Registry; Reception and assignment; Packing and unpacking; Shipment; Storage; Catalogues, blanks, and labels; Acknowledgments; Transportation.)

## Department C.—Archives.

(Records and Registers; Files.)

## Department D.—Library.

## Department E.—Publication.

## Department F.—Duplicates and Exchanges.

(Preparation of duplicates for distribution; Distribution of duplicates; Applications and proposals for exchanges.)

## Department G.—Property and Supplies.

(Purchase; Registry; Storage; Requisitions and issue; Samples and price-lists.)

## Department H.—Accounts.

(Estimates; Contracts and orders; Audit; Disbursement.)

## Department I.—Buildings and Labor.

(Police and inspection; Mechanics and labor; Heating and lighting; Construction and repairs; Cleaning; Public comfort.)

## Department K.—Electric Service.

(Telephone service; Time service; Burglar alarm service; Watch-clock service.)

## Department L.—Preparation.

(Taxidermy; Modeling; Skeleton preparation; Mounting and attaching labels; Lapidaries' work; Stone-cutting work; Draughting; Photographing; Painting; Poisoning and applying preservatives.)

**CLASSIFICATION OF OFFICERS AND EMPLOYEES.**

The officers and employees of the Museum are graded and designated as follows:

Grade.	Title.	Monthly salary.
I.	Director .....	
II.	Assistant Director .....	
III.	Curators .....	
IV.	Assistant Curators .....	
	Preparators (7th class) .....	
V.	Assistant (2d class) .....	
	Preparator (6th class) .....	
	Mechanic (9th class) .....	
VI.	Assistant (1st class) .....	
	Preparator (5th class) .....	
	Aid (8th class) .....	
	Clerk (7th class) .....	
	Mechanic (8th class) .....	
VII.	Aid (7th class) .....	
	Preparator (4th class) .....	
	Clerk (6th class) .....	
	Mechanic (7th class) .....	
VIII.	Aid (6th class) .....	
	Preparator (3d class) .....	
	Clerk (5th class) .....	
	Mechanic (6th class) .....	
IX.	Aid (5th class) .....	

*Classification of officers and employes—Continued.*

Grade.	Title.	Monthly salary.
IX.	Preparator (2d class).....	
	Clerk (4th class).....	
	Mechanic (6th class).....	
X.	Aid (4th class).....	
	Preparator (1st class).....	
	Clerk (3d class).....	
	Mechanic (5th class).....	
XI.	Aid (3d class).....	
	Preparator (1st class).....	
	Clerk (3d class).....	
	Mechanic (5th class).....	
XII.	Aid (2d class).....	
	Clerk (1st class).....	
	Mechanic (4th class).....	
XIII.	Aid (1st class).....	
	Copyist (6th class).....	
	Mechanic (3d class).....	
	Watchman (3d class).....	
XIV.	Copyist (5th class).....	
	Mechanic (2d class).....	
	Watchman (2d class).....	
XV.	Fireman (2d class).....	
	Copyist (4th class).....	
	Mechanic (1st class).....	
	Watchman (1st class).....	
	Fireman (1st class).....	
	Laborer (3d class).....	
XVI.	Copyist (3d class).....	
	Laborer (2d class).....	
	Attendant (2d class).....	
	Cleaner (2d class).....	
XVII.	Copyist (2d class).....	
	Messenger (4th class).....	
	Laborer (1st class).....	
	Attendant (1st class).....	
	Cleaner (1st class).....	
XVIII.	Copyist (1st class).....	
	Messenger (3d class).....	
XIX.	Messenger (2d class).....	
XX.	Messenger (1st class).....	

The grading of special officers of the Museum not mentioned by title in the foregoing lists is for the present adjusted as follows:

- IV. Modeler (7th class preparator).
- V. Chemist (2d class assistant).
- Registrar (2d class assistant).
- Artist (6th class preparator).
- Superintendent of Buildings (2d class assistant).
- Engineer (9th class mechanic).
- VIII. Electrician (6th class mechanic).
- X. Taxidermist (1st class preparator).

**DUTIES OF OFFICERS.****XVII.**

*Assistant Director.*—The Assistant Director will have entire charge of everything connected with the general administration of the establishment. All requisitions for materials and supplies will be made upon him and furnished only on his approval, or in his absence upon that of the Chief Clerk of the Smithsonian Institution.

All details connected with the general administration and the routine of the Museum, the assignment of space, the construction of cases, and the recording, labeling, and installation of specimens will be in charge

of the Assistant Director. He will also employ, or assign, laborers and assistants so as best to facilitate the operations of the Museum, and will co-operate with the Chief Clerk of the Smithsonian Institution in all matters in which the general interests of the establishment are concerned.

### XVIII.

*Curators.*—The Curators and Acting Curators will be held responsible for the preservation and proper use of all objects belonging to the departments under their charge. They will direct the labors of such assistants as may be assigned to them. They will receive and make entry of specimens sent them by the registrar and make the necessary reports on the accession cards upon their names and nature for use in the preparation of the "list of accessions." They will keep the collections under their charge conveniently and accessibly arranged either in the exhibition halls or in the laboratories belonging to their respective departments and will aid investigators in gaining access to specimens which they may desire to consult. They will conduct such correspondence as may be assigned to them, in accordance with the regulations laid down in the section of this document relating to correspondence.

### XIX.

*Reports of Curators.*—Curators and Acting Curators will make *monthly* reports to the Director of the Museum of the work done in their respective departments, designating its general character, the number of specimens entered or catalogued, and such details as may be necessary to furnish a current history of the operations of the Museum.

### XX.

*Assistants.*—Assistant Curators, Assistants, and Aids (above grade X) may be assigned to duty as "acting curators" of departments, in which case they are subject to curators' rules. Otherwise they will be detailed to special duty as assistants to curators or to service in the *Division of Administration*.

### XXI.

*Clerks, Copyists, and Messengers.*—Clerks, Copyists, and Messengers will be detailed to work under the direction of the chief of some department.

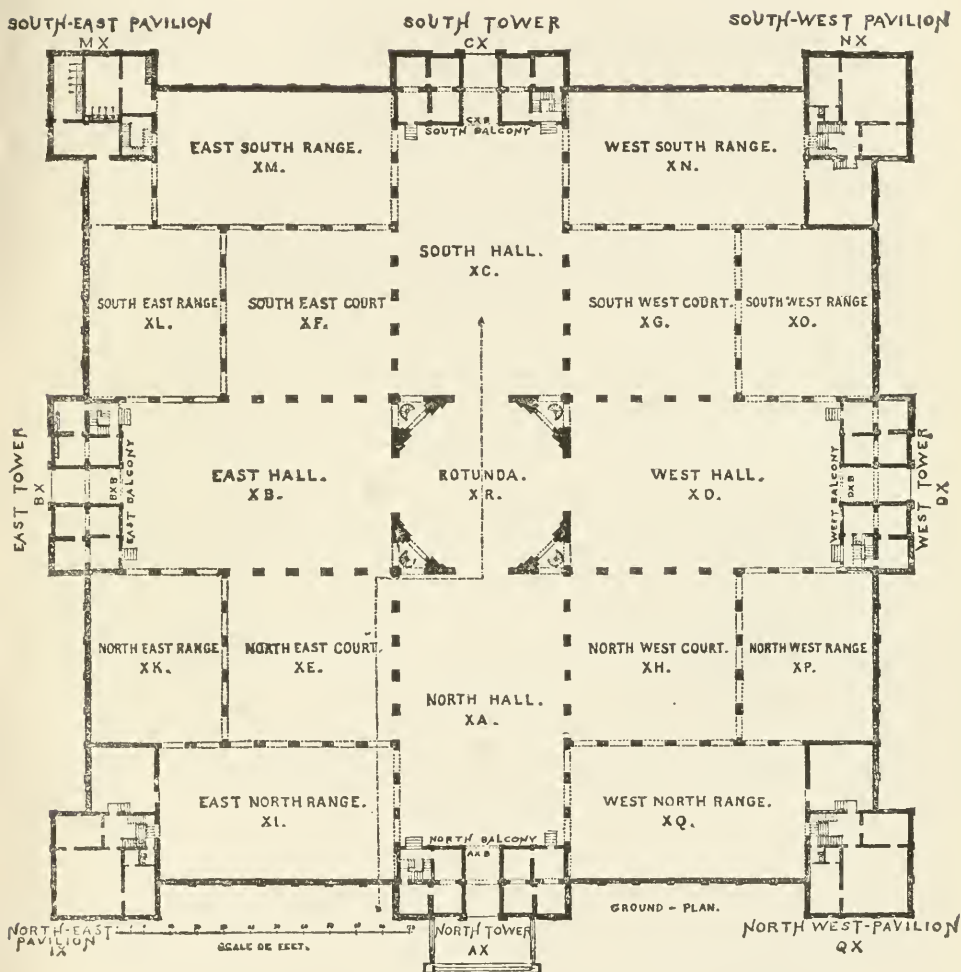
### XXII.

*Artists and Preparators.*—Artists and Preparators, when not otherwise assigned, will report for instructions to the Assistant Director.

### XXIII.

*Mechanics, Laborers, Attendants, and Cleaners.*—Mechanics, and Laborers, Attendants, Cleaners, &c., when not otherwise assigned, will report for instructions to the Superintendent of Buildings.

The duties of special officers will be explained in the regulations of the special departments.



Plan of the National Museum, Washington, D.C.

(491)



**BUILDINGS AND APARTMENTS.****XXIV.**

The buildings occupied by the National Museum are:

The Smithsonian Institution [in part].

The National Museum.

The Armory.

The Annex [including stable].

**XXV.**

*Designation of Rooms.*—The general system by which rooms and doors are designated need not be explained here. A definite nomenclature for the different apartments or suites of apartments used in the work of the Museum is necessary and such a one is here presented, together with a code of symbols to be used in their designation. These symbols are intended for use in making assignments, in marking disposition of property upon the "Property Record," and in marking keys of cases, desks, &c.

The various apartments and suites of apartments in the buildings may be classified as follows:

*Exhibition Halls* [Symbol, X] are rooms in which objects are publicly displayed.

*Laboratories* [Symbol, L] are suites of rooms under the charge of a curator or acting curator, including his study and those of his aids, and the store-rooms and work-rooms used in connection with the laboratory, even though not adjacent.

*Depositories* [Symbol, D] are storage, file, or supply rooms in which packages or supplies are stored.

*Offices* [Symbol, O] are the places of business of executive officers.

*Work Rooms* [Symbol, W] are rooms or suites occupied by preparators or mechanics.

*Public Comfort Rooms* [Symbol, P] are retiring-rooms, waiting-rooms, restaurants, &c.

The *Exhibition Halls* are designated as follows:

**MUSEUM BUILDING.**

*Main Halls.*—These are the four arms of the cross, extending from the Rotunda to the four main entrances:

North Main Hall.....	XA
East Main Hall.....	XB
South Main Hall.....	XC
West Main Hall.....	XD

*Courts.*—These are the four square halls included between the Main Halls in the angles joining the Rotunda:

North East Court.....	XE
South East Court.....	XF
South West Court.....	YG
North West Court.....	XH

*Ranges*.—These are the outer halls, eight in number. Those on the north side are the *North Ranges*—"East North" and "West North." Those on the east side the *East Ranges*—"North East" and "South East." Those upon the south side are the *South Ranges*—"East South" and "West South." Those on the west side are the *West Ranges*—"South West" and "North West":

East North Range.....	XI
North East Range.....	XK
South East Range . . . . .	XL
East South Range.....	XM
West South Range.....	XN
South West Range.....	XO
North West Range.....	XP
West North Range.....	XQ

*The Rotunda* is under the Central Dome:

Rotunda . . . . .	XR
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The *Pavilions* and *Towers*, though not exhibition rooms, may, if necessary, be designated by symbols corresponding to those of the main halls, by transposing the letters of the symbol of the apartment into which their doors open, *e. g.*:

N. Tower.....	AX
E. Tower.....	BX
S. Tower . . . . .	CX
W. Tower . . . . .	DX
NE. Pavilion.....	IX
SE. Pavilion . . . . .	MX
SW. Pavilion.....	NK
NW. Pavilion . . . . .	QX

The rooms and doors in the Smithsonian Building are already classified by a very perfect system, elsewhere published.

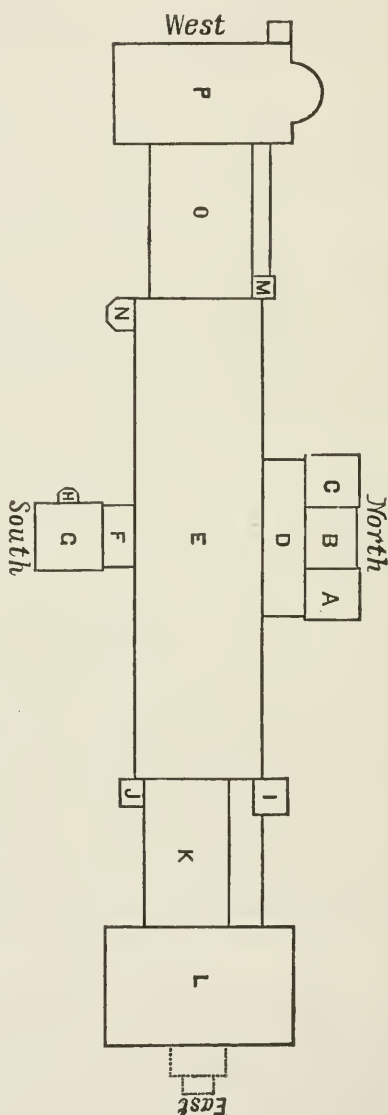
The *Exhibition Halls* are designated as follows:

South Vestibule...[G and F, 1st story] . . . . .	XS
Main Hall . . . . .[E, 1st story] . . . . .	XT
Upper Main Hall..[E, 2d story].....	XU
West Range . . . . .[O, 1st story] . . . . .	XV
West Hall . . . . .[P, 1st story] . . . . .	XW
North Vestibule . . . . .	XX

## SMITHSONIAN BUILDING.

In this building, to conform to an early system, each part of the building, from cellar to roof, is designated by a pair of letters, and the separate apartments are designated by three letters. The general assignment of symbols is as follows :

- |   |  |
|---|--|
| <p>A. North central tower, east of main entrance.<br/>         B. Space between north central towers A and C.<br/>         C. North central tower, west of main entrance.<br/>         D. Hall between north central towers and main building.<br/>         E. Main central building.<br/>         F. Space between main building and south central towers.<br/>         G. South central tower.<br/>         H. Small tower attached to west side of main south central tower.</p> | <p>I. Tower at at northeast corner of main building.<br/>         J. Tower at southeast corner of main building.<br/>         K. East connecting range and corridor.<br/>         L. East wing.<br/>         M. Tower at northwest corner of main building.<br/>         N. Tower at southwest corner of main building.<br/>         O. West connecting range and corridor.<br/>         P. West wing.<br/>         Q. West tower.</p> |
|---|--|



## XXVI.

## ASSIGNMENT OF APARTMENTS.

## LABORATORIES.

Art and Industry Laboratory	[QX, 3d floor]	LA
Archeological Laboratory	[A, B, C, 3d floor]	LB
Materia Medica Laboratory	[DX (North), 1st floor]	LC
Food Laboratory		LD
Bird Laboratory	[G, 5th and 6th floors]	LE
Reptile Laboratory	[O (SE.), basement]	LF
Fish Laboratories	[P, basement]	LG
	[O (NE.), 1st & 2d stories]	
Invertebrate Laboratories	[O (SW.), basement]	LH
	[O, (NW.), 1st story]	LI
Mollusk Laboratory	[A, B, C, 4th floor]	LK
Insect Laboratory	[MX (NE.), 2d floor]	LL
Annelid Laboratory	[AX (E), 3d floor]	LM
Paleontological Laboratory	[CX (W.), 1st floor]	LN
Fossil Plant Laboratory	[CX (E.), 1st floor]	LO
Mineral Laboratory	[DX (S.), IVX]	LP
Chemical Laboratory	[NX, 2d floor]	LQ
Photographic Laboratory	[MX, 2d and 3d floors]	LR
Registry Rooms	[I, J, K, L, basement]	LS

## DEPOSITORIES.

Library	[QX, annex, 1st floor]	DA
Archive Room	[QX, first floor]	DB
Label Room	[QX, 2d floor]	DC
Sample Depository		DD
Curator's Supply Deposit	[QX, annex, 2d floor]	DE
Bottle Deposit, No. 1	[P, apse, basement]	DF
Bottle Deposit, No. 2	[QX, basement]	DG
Alcohol Depository	[Q, basement]	DH
Superintendent's Depository	[IX, basement]	DI
Duplicate Depository	[K (SW.), basement]	DK
Modeler's Depository	[O (S.), basement]	DL
Temporary Storage	[L (SE.), basement]	DM
General Storage	[O (N.), basement]	DN
Private Storage	[L (NE.), basement]	DO
Stationery	[K ( ), 2d story]	DP

## OFFICES.

Director's Office and Office of Secretary S. I	O
Office Chief Clerk S. I.	OA
Office Assistant Director	OB
Office of Registrar	OC
Office of Accountant	OD
Office of Superintendent of Buildings	OE
Office of Assistant Superintendent of Buildings	OF

## WORK-ROOMS.

Modeler's Room.....	WA
Taxidermist's Room.....	WB
Artist's Room.....	WC
Assistant Modeler's Room.....	WD
Preparator's Room.....	WE
Poisoner's Room.....	WF
Electrician's Room.....	WG
Engineer's Room and Fire-room, No. 1 (Smithsonian). . .	WH
Engineer's Room and Fire-room, No. 2 (Museum).....	WI
Machinist's room.....	WK
Carpenter's Shop.....	WL
Painter's Room.....	WM
Stone-cutter's Room.....	WN
Lapidary's Room.....	WO
Draughtsman's Room.....	WP

## PUBLIC COMFORT ROOMS.

Public Comfort Room.....	P
Lunch Room.....	PA
Ladies' Reception Room.....	PB
Ladies' Lavatory, Museum.....	PC
Men's Lavatory, Museum.....	PD
Ladies' Lavatory, Smithsonian.....	PE
Ante-room, Smithsonian.....	PF

**DIVISION OF ADMINISTRATION.**

## DEPARTMENT OF DIRECTION.

## XXVII.

*Installation.*—The assignment of floor space and exhibition cases in the public halls, the arrangement of the cases, their interior fittings, the styles of labels and the manner of their attachment, the stands and the manner of mounting the specimens, will be under charge of the Assistant Director, who will confer upon these points with the Curators.

## XXVIII.

*Furniture.*—The construction and purchase of cases and furniture and the assignment of the same to offices and laboratories will be under the charge of the same officer.

## XXIX.

*Apartments.*—Applications for the use of apartments should be made in writing to the Assistant Director, who will submit them to the Director for approval.



## XXX.

*Use of keys.*—Keys will be issued only upon requisition, and must be receipted for. Holders of keys will be held responsible for their safe-keeping; they must not lend them or allow them to pass out of their own hands. No one will be allowed to obtain duplicates except by requisition. The loss of keys should be promptly reported. Keys not in use are to be returned to the office from which they were obtained. The loss of keys should be at once report to the Superintendent of Buildings.

## XXXI.

*Issue of keys.*—Keys to doors in the Smithsonian Building not assigned to the Museum are controlled by the Chief Clerk of the Smithsonian Institution.

Keys to doors in National Museum and other buildings will be kept by the Superintendent, who will issue them only upon requisitions indorsed by Director or Assistant Director.

Keys to exhibition cases will be kept in office of Assistant Director.

## XXXII.

*Apartments in Smithsonian Building.*—Apartments in the Smithsonian Building which may be desired for the use of the Museum may be transferred to the control of the management of the Museum by requisition from said management upon the Chief Clerk of the Smithsonian Institution.

## XXXIII.

*Catalogues.*—The following MS. Records are kept:

Name.	Symbols.
Announcement Record .....	Ann.
Accession Records .....	A.
Card Catalogue of Accessions .....	A.C.
Distribution Records .....	D.—
Transportation Record .....	T.
Storage Record .....	S.
Property Record .....	P.
Order Book .....	O.—
Lost and Found Record .....	L.F.
Time Book .....	TB.
Visitors' Register .....	R.
Drawings, &c. ....	Draw.
Electrotypes and Engravings .....	Eng.
Photographic Registers .....	Phot.
Ethnological Catalogue .....	C.I-III.
[Volumes assigned to separate departments.]	
Mammal Catalogue .....	C.IV.
Bird Catalogue .....	C.V.
Proc. Nat. Mus. 81—32	(497)

Egg Catalogue .....	C.V-a
Reptile Catalogue .....	C.VI.
Fish Catalogue .....	C.VII.
Shell Catalogue .....	C.VIII.
Insect Catalogue .....	C.IX.
<i>i. e.</i> , the number of a given department affixed to the letter C. giving its symbol. Thus the Library Catalogue would be.....	
	C.D.-

## XXXIV.

*Labeling exhibition series.*—Each object displayed in the exhibition series is to be provided with a printed label, giving (*a*) catalogue number, (*b*) names, (*c*) locality, (*d*) source of obtaining, and (*e*) such explanatory remarks as may be practicable for the purpose of enabling visitors to understand its significance.

The copy for these labels, with designation of size, according to schedule provided, should be delivered to the Assistant Director, who will attend to the printing.

## XXXV.

*Sizes of labels.*—The size of labels to be designated by the size of the space inclosed within the rectangular rule which surrounds the legend upon each label.

The margin outside of this rule to vary as may be necessary, in accordance with the size of the card.

The size of the label to be designated by two letters; the first indicating height, the second length.

The unit of measurement to be one inch.

The larger cards to be multiples of the unit.

The letters shall stand for the numbers in order as follows: A = 1; B = 2; C = 3, &c.

A card 2 inches square would be BB; 3×6 inches, CF; a card 6×3, FC, &c., &c.

Labels to be printed on thick card-board, unglazed, of some soft neutral tint.

## XXXVI.

*Plans for installation and arrangement.*—The collections in the National Museum are now being assorted and rearranged, for the purpose of placing on exhibition a selected series of objects which shall be of interest to visitors, and of making the remainder serviceable for purposes of scientific and technological investigation. A large portion of the most interesting material has never yet been exhibited on account of lack of space.

The following general principles have been adopted in this work:

1. No object will be placed on exhibition which is not of evident educational value, and likely to interest and instruct a considerable percentage of the persons visiting the Museum.

2. The exhibition of duplicate material is to be avoided.

3. Each object will be placed in a case of the form best suited for its effective display, and the light, color of the background, &c., will be so adjusted as to show it to best possible advantage, and with the least possible fatigue to the eyes of the visitor.

4. Each object, or group of objects, will be accompanied by a large, plainly printed label, which will give a concise description of what is shown, an account of its origin and uses, a synopsis of its history, and the name of the person or organization contributing it to the Museum.

5. The objects will be grouped together in systematic order, and each case will be provided with a general descriptive label. In the case of collective exhibits, the general label may also give the name of the contributor.

6. The specimens will be illustrated and supplemented by pictures, diagrams, books, and maps, in such manner that the Museum will form an encyclopedia, the illustrations for which are in the exhibition cases, the text in the labels.

7. Guide-book manuals of the different departments will be published, which will embody in concise and systematic form the information given by the specimen labels, together with such illustrative material as may seem necessary to present in addition.

### XXXVII.

*Use of material for investigation.*—Persons not officers of the Museum may obtain access to the collections for purposes of study by filing an application, which must be indorsed by the Director. Such investigations must be conducted in the Museum buildings, and the Curator of each department is required to see that the materials are properly used, without loss to the Museum.

### XXXVIII.

*Loans of material.*—No collections will be sent out of the city for study, except to officers of other museums, and then only by special arrangement.

### XXXIX.

*Announcement of proposed investigations.*—It is strongly recommended that officers of the Museum contemplating the prosecution of investigations upon special groups in the departments under their charge file statements of their intention, in order to secure priority in the use of material.

### XI.

*Property receipts.*—The following form of "receipt" from naturalists who may borrow its material, has been adopted by the Institution:

[Locality ———, date ———.]

"Received from the Smithsonian Institution a collection of ———,

corresponding to the accompanying list. I hereby accept them in trust upon the following conditions: First. That they are to be used for purposes of investigation, and returned in as good condition as they were received, and as soon as my work upon them is completed. Second. That no unique specimens constituting part of the reserve series of the National Museum shall be mutilated. Third. That duplicates when necessary may be dissected, understanding by 'duplicate' a specimen which is not necessary to illustrate variations of form or range of geographical distribution. Fourth. That the specimens when returned shall be labeled with the names which I have employed in my publications upon them. Fifth. That credit shall be given to the Smithsonian Institution in all publications based upon material furnished by it."

[Signature of borrower.]

#### COMPLAINTS.

##### XLI.

Any failure on the part of an officer or employé to properly perform his duties should be promptly reported in writing to the Director; also to the Assistant Director any losses of specimens, or any damages received by specimens in the Museum or in packing and transit.

#### PASSES AND PERMITS.

##### XLII.

Passes for individuals and permits to remove articles must be signed by the Director, the Assistant Director, or the Chief Clerk of the Smithsonian Institution.

#### CORRESPONDENCE.

##### XLIII.

Correspondence of a formal or complimentary character, transmitting specimens or books, acknowledging gifts or courtesies, making arrangements for exchanges, &c., &c., as well as all announcements, circulars and communications of general importance will be signed by the Director, who may request any officer of the Museum to prepare such writing.

Letters of an informal character should be signed by the officer to whom they are referred, the signatures being accompanied by the signers' official title.

All correspondence relating to the general administration of the Museum will be in charge of the Assistant Director and the Registrar.

The Curator of each department will attend to correspondence relating especially to the matters under his charge.

Copies of all official letters must be kept either in copy book or stylograph book, and these books shall constitute a part of the archives of the Museum.

When the symbol A is marked upon a letter it signifies that an answer is to be prepared for the signature of the Director. When the

symbol is *a*, it means that the answer is to be signed by the person to whom it is referred.

All letters referred are to be returned to the officer from whom they are received. If a copy of any letter, or portion of letter, is desired, which the Curator has no facilities for making, the passage should be marked and the symbol C with signature added. The copies will be made by the Museum copyist.

All letters are to be filed in the archives of the Museum, according to the specifications of the section relating to *Archives*, LXXVI. They will there be always readily accessible.

#### LETTERS—REQUESTS FOR INFORMATION.

##### XLIV.

Officers of the Museum will pay prompt attention to any requests for information which may be referred to them for action, it being considered an important part of the work of the Museum to attend to such matters fully, courteously, and promptly. The rule of the Smithsonian Institution that each day's mail shall be attended to on the day of its receipt, is to be followed in the Museum also.

#### CONFERENCES AND COMMUNICATIONS.

##### XLV.

The symbol C indicates that a personal conference is desired.

The Director will confer personally with the officers of the Museum in his office in the afternoon, or in his visits to the several departments.

Every communication on Museum business, whether it be an announcement or a request, should be made in the form of a written memorandum. The same should be done if any action is decided upon as the result of a conference. It is recommended that in communications between officers of the Museum, the stylograph be used, since this affords a means of preserving duplicate copies of the communication.

##### XLVI.

#### EXPLANATION OF SYMBOLS USED IN BUSINESS OF THE SMITHSONIAN INSTITUTION AND THE NATIONAL MUSEUM.

##### *Action to be taken.*

*L.* Library.

*M.* For files of the Museum.

*S.* For files of the Smithsonian Institution.

*F.* For files of the United States Fish Commission.

*A.* Answer.

*a.* Prepare answer.

*r.* To be read, and contents noted.

*C.* Personal conference desired.

*k.* To be kept until article announced arrives and to be then returned.



*t.* To be translated.

**\*\*.** Confidential.

*r.* (As a second letter)—to be returned as soon as possible.

*f.* To be filed in general correspondence, or under special head designated.

The combination of two letters shows that double action is to be taken: as—*a. r.* Answer and return; *t. r.* Translate and return; *r. r.* Read and return; *S. f.* File in Smithsonian correspondence.

*Abbreviations for reference of letters, &c.*

Baird, S. F .....	B.
Bean, T. H .....	Bn.
Boehmer, G. H. ....	Br.
Brown, S. C. ....	S. C. B.
Brown, S. G. ....	S. G. B.
Brown, J. T. ....	J. T. B.
Cushing, F. H. ....	F. H. C.
Daingerfield, Miss .....	Dd.
Dall, W. H. ....	Dl.
Dewey, F. P. ....	Dy.
Flint, Dr. ....	F.
Foreman, E. ....	Fn.
Gass, Henry .....	G.
Goode, G. B. ....	G. B. G.
Gill, Herbert A. ....	H. G.
Griffin, Miss M. E. ....	M. G.
Hawes, G. W. ....	G. W. H.
Hobbs, George S. ....	G. S. H.
Horan, Henry .....	H. H.
Leech, D. ....	L.
Mason, O. T. ....	Mn.
Powell, J. W. ....	P.
Rhees, W. J. ....	R.
Rau, C. ....	C. R.
Ridgway, Robert .....	R. R.
Rathbun, Richard .....	R. Rn.
Smiley, C. W. ....	C. S.
Stoerzer, Mrs. L. ....	L. S.
Shindler, A. Z. ....	A. Z. S.
Smillie, T. W. ....	T. S.
Taylor, W. B. ....	T.
Taylor, F. W. ....	F. W. T.
True, F. W. ....	Tr.
Turner, Miss J. A. ....	J. T.
White, C. A. ....	C. A. W.

Assistants should always write their initials in the upper right-hand corner of the first page of letter which they have prepared for signatures

## INK TO BE USED IN MUSEUM WORK.

## XLVII.

*Ink to be used in Museum work.*—Every officer of the Museum is required to have upon his desk two kinds of ink.

*a. Record ink*, in which all catalogue entries and other writings of permanent record are to be made. This must be a nutgall or carbon ink (not aniline).

*b. Copying ink*, in which all correspondence should be conducted.

## XLVIII.

## GENERAL RULES.

The exhibition halls are open to the public from 9 a. m. to 4.30 p. m. every day in the year, except Sundays.

## XLIX.

The business offices are open from 9 a. m. to 4 p. m.

## L.

The work-rooms and shops are open from 7.30 a. m. to 4.30 p. m.

## LI.

No smoking allowed in the public halls.

## ROUTINE ADMINISTRATION OF COLLECTIONS.

## LII.

*Routine administration of collections.*—The full routine for the administration of objects received in the Museum is as follows:

1. The package is received by the Registrar, who, if necessary to ascertain the nature of its contents, opens it, and if it contains objects belonging to several departments unpacks it and distributes its contents to the proper receptacles in the *sorting-room*.

2. The Registrar notifies the sender of the package that it has been received.

3. The Registrar enters the package in the Accession Record.

4. The Registrar writes upon an "Accession Card" the facts concerning the accession, and submits this card to the Director and Assistant Director, one of whom marks its assignment to one of the Museum departments.

5. The Registrar now sends the contents of the package or packages to the chief of the department to which assignment has been made, accompanied by the accession card and such other memoranda and letters as may help to complete its history.

6. The Curator examines and identifies the objects, writes upon the

accession card the entries necessary to complete the record for the "List of Accessions" and the "Historical File," and returns card and memoranda without delay to the Registrar.

7. The Curator enters the specimen or specimens in the Museum Catalogue belonging to his department.

8. The Curator marks each specimen indelibly with catalogue number, locality, and donor.

9. The Curator, after submitting the specimens, if necessary, to a preparator, assigns them places in the exhibition series, the study series, or the duplicate series.

10. The Curator also keeps a systematic or ledger record of the specimens, either upon catalogue-cards or upon the Museum register-sheets.

11. A letter of thanks, prepared under the direction of the Registrar, and signed by the Director, is sent to every person who has given specimens to the Museum.

## DEPARTMENT OF REGISTRY AND STORAGE.

### RECEPTION AND RECORD ROUTINE.

#### LIII.

All packages coming by wagon to be received by the Transportation Clerk of Smithsonian Institution and entered in his record of transportation, for the purpose of checking the accounts of express companies and cartmen. Number of Transportation Record, prefixed by letter "T," to be marked upon them.

#### LIV.

All packages of specimens coming through the hands of the Transportation Clerk, by messenger, mail, or in exchange boxes, to be delivered to the Registrar.

#### LV.

Packages received in other buildings, of whatever nature, the property of the Museum, or intended for use in the Museum, must be reported by the person receiving them, who shall deliver full written memoranda to the Registrar before 4 p. m. on the day of receipt.

#### LVI.

The Registrar shall enter all packages received, in serial order, in the Accession Record, and, when practicable, mark upon each its accession number, preceded by the letter A.

#### LVII.

The Registrar may open any package of the nature of whose contents he is ignorant, and when it contains articles belonging to different departments shall unpack and assort them.

## LVIII.

The accessions of each day shall be arranged in serial order in the unpacking room, and the Registrar shall daily prepare a list of the accessions upon the blank "Accession Cards," which shall pass through the hands of the Assistant Director to the Director and be reclaimed from the Director's office by the Registrar; such additional facts as may be necessary to complete the record being written in.

## LIX.

The packages are to remain in the unpacking room until the "Accession Cards" have been returned. If special instructions concerning any package are needed they will be inscribed upon the cards. The packages may then be removed to the "Sorting Room."

## LX.

The sorting room is provided with closets with glass doors. One closet will be assigned to each department, and the Curator will be furnished with a key to its door. In assigning objects to the several departments, the schedule number of the department will be used as a symbol. The following additional symbols may be used:

S. I. . . . . Smithsonian Institution.

F. C. . . . . Fish Commission.

P. . . . . Private.

M. . . . . Mistake—to be returned.

H. . . . . Hold without unpacking until further instruction.

Also, the symbols for the various deposits.

## SORTING AND DISTRIBUTION.

## LXI.

The Registrar, after sorting the objects into lots, may send them direct to their destination or may place them in the closets, subject to the order of the Curator to whom they are referred. When a package belongs to a single department it should not be unpacked by the Registrar.

## LXII.

Each accession lot or portion of accession lot sent out by the Registrar is to be accompanied by an accession card, upon which are written

(a.) The accession number.

(b.) Name and address of sender.

(c.) References to any explanatory letters or memoranda which may be on file. [When thought desirable, these may accompany the card]

(d.) Any other facts not ascertainable from the specimens. The Registrar shall retain a duplicate of this card upon which is marked the name of the Curator to whom the accession lot is delivered.

## LXIII.

The Curator, after receiving an accession lot, shall, at his earliest convenience, and as a matter of urgent routine business (if possible the same day), fill up the accession card with the data necessary for the "Descriptive List of Accessions," and return it to the Registrar, who shall file it in the Card Catalogue of Accessions, the accompanying memoranda being placed in the Historical File, after the printer's copy for the list of accessions has been prepared. The Accession Cards for the current year are kept in a separate series and are not distributed in the General Card Catalogue until the yearly report has been prepared.

## LXIV.

When an accession lot is divided the general accession number is to be attached to each sub-lot, followed by the symbol of the department to which it is referred.

## LXV.

If the accession cards are not promptly returned the Registrar is to send a recall-memorandum.

## ANNOUNCEMENT AND ACKNOWLEDGMENT.

## LXVI.

The Registrar is to make the entries in the Announcement Record and to present on the first of each month a list of arrearages of announcements.

## LXVII.

When a package has been received the Registrar is to acknowledge the fact on the same day, by postal-card memorandum to sender.

## LXVIII.

The Registrar shall have prepared for the signature of the Director the formal letters in acknowledgment of gifts.

## LXIX.

Letters or postal-cards announcing shipment of packages are to be prepared by the Registrar.

## CONTRIBUTIONS AND THEIR ACKNOWLEDGMENT.

## LXX.

No money having at any time been specially appropriated for increasing the collections by purchase, the growth of the Museum has ever been and still is dependent solely upon the exertions of its officers and those of other branches of the public service, and upon the public spirit and liberality of its friends.



The friends of the Smithsonian Institution and the National Museum are earnestly invited to take part in the work of building up the collections, and, in particular, to respond to special requests for advice or other aid, which may reach them by letter.

The following rules for the acknowledgment of specimens will be adhered to:

1. Each contribution will be recognized by a formal written acknowledgment from the Director.

2. Each contribution will be announced in the annual reports of the Smithsonian Institution and the National Museum; and in the catalogues and other publications of these establishments, in which the objects contributed may be alluded to, the name of the contributor will always be given.

3. On the label, which is invariably attached to every object, the name of the contributor will be conspicuously printed. In the case of donations the form will be, "Gift of ————," and where the objects have been obtained by special exertions of a friend of the Museum, who, however, is not their donor, the form will be, "Obtained by ————," or "Collected by ————."

4. Objects which may have been bought by special appropriations, such as those for the Philadelphia and Berlin exhibitions, will not be labeled with the name of the persons from whom purchased, except by special agreement in cases where these persons have been only in part paid for their exertions.

5. The Museum will make every possible return for aid rendered by offering in exchange its publications and its duplicate specimens.

#### PACKING AND SHIPMENT.

##### LXXI.

Packing will be done under the direction of the curators or in the packing room under the supervision of the Registrar, to whom objects to be packed may be sent with written memorandum of instructions.

Packing boxes may be obtained by requisition on the Registrar.

##### LXXII.

Each package intended for shipment by express, freight, mail, or messenger, shall pass through the hands of the Registrar, and shall be accompanied by a memorandum, specifying its contents, and signed by the sender or packer. The Registrar shall make the proper entries in the Distribution Book.

##### LXXIII.

The Registrar will have special instructions as to what classes of packages need the indorsement of the management of the Museum before they can be sent out of the building.

## LXXIV.

No Museum package is to be sent by the Transportation Clerk which has not been stamped with the proper cipher and marked with the words *Express, Fast Freight, Freight, Mail, or Messenger.*

## SHIPMENT OF PACKAGES TO THE MUSEUM.

## LXXV.

Packages of small size may be sent by express, charges to be collected on delivery, and larger packages by freight.

Packages may also be sent from points in the vicinity of military posts by addressing them to "*U. S. National Museum, care of Depot Quartermaster (stating name of post)*", the quartermaster having instructions to forward all such packages.

On the Pacific slope, packages may also be sent in care of the Alaska Commercial Company, San Francisco.

Foreign packages intended for the Museum may be sent by mail, addressed to the Smithsonian Institution, Washington, D. C., or, if of large size, through the following agents of the Smithsonian Institution:

Algeria: Commission Française des Échanges Internationaux, Paris.	Java: Genootschap van Kunsten en Wetenschappen, Batavia.
Australia: See New South Wales, New Zealand, Queensland, South Australia, Tasmania, and Victoria.	Mauritius: William Wesley, London.
Austria-Hungary: Dr. Felix Flügel, 49 Sidonien Strasse, Leipzig.	Mexico: Museo Nacional, Mexico.
Belgium: Commission Belge d'Échange Internationaux, Brussels.	Netherlands: Bureau Scientifique, Professor von Baumhauer, Harlem.
Brazil: Instituto Historico, Geographico y Ethnographico, Rio Janeiro.	New South Wales: Royal Society of New South Wales, Sydney.
Chile: Universidad, Santiago.	New Zealand: Parliamentary Library, Wellington.
China: U. S. Consul-General, Shanghai.	Norway: Kongelige Norske Frederiks Universitet, Christiania.
Cuba: Prof. F. Poey (R. University), Havana.	Portugal: Escola Polytechnica, Lisbon.
Denmark: Kongelige Danske Videnskabsbernes Selskab, Copenhagen.	Queensland: Government Meteorological Observatory, Brisbane.
France: Commission Française des Échanges Internationaux, Paris.	Russia: Commission Russe des Échanges Internationaux, St. Petersburg.
Germany: Dr. Felix Flügel, 49 Sidonien Strasse, Leipzig.	South Australia: Astronomical Observatory, Adelaide.
Great Britain: William Wesley, 28 Essex street, Strand, London.	Spain: Real Academia de Ciencias, Madrid.
Greece: By mail direct.	Sweden: Kongliga Svenska Vetenskaps Akademien, Stockholm.
Haiti: Secrétaire de l'Etat des Relations Extérieures, Port-au-Prince.	Switzerland: Bundeskanzlei, Berne.
Holland: See Netherlands.	Syria: By mail direct.
India: William Wesley, London.	Tasmania: Royal Society of Tasmania, Hobarton.
Italy: Biblioteca Nazionale Vittorio Emanuele, Rome.	Turkey: By mail direct.
	Venezuela: Universidad [Dr. A. Ernst], Caracas.
	Victoria: Public Library, Melbourne.
	West Indies: By mail direct.

If sent from seaport towns by vessel to New York, packages may be directed to Smithsonian Institution, care of Collector of Customs, port of New York.

## DEPOSITORIES AND STORE-ROOMS.

## LXXVI.

The classification and designation of the several depositories and storage rooms has already been detailed. The assignment of material to these deposits is as follows :

The *Library* (DA) shall contain all printed books and papers.

*Librarian.*

The *Archive Room* (DB) shall contain all manuscripts, books, and papers relating to the history of the Museum and its contents.

*Assistant Director.*

The *Label Room* (DC) shall be the depository for labels and blanks, and may be used as a work-room for labeling and cataloguing.

*Registrar.*

The *Sample Deposit* (DD) shall receive samples of all kinds of articles used in the museum, drawings and specifications, and dealers' price-lists and circulars.

*Assistant Director.*

The *Supply Deposit* (DE) contains curator's supplies of all kinds, needful for mounting and preservation; stands, label-holders, &c.

*Registrar.*

The *Bottle Deposits* No. 1 (DF), in Smithsonian building, and No. 2 (DG), in Museum building, shall contain bottles.

*Superintendents.*

The *Alcohol Deposit* (DII) shall contain alcohol on tap.

*Curator of Ichthyology.*

The *Superintendent's Deposit* (DI) shall contain supplies for mechanics and laborers.

*Superintendent.*

The *Duplicate Deposit* (DK) is the receptacle for duplicate specimens awaiting distribution.

*Registrar.*

The *Modeler's Deposit* (DL) contains molds and unfinished casts.

*Modeler.*

The *Temporary Storage* (DM) is a deposit for packages pending administration.

*Registrar.*

The *General Storage* (DN) is the receptacle for packages set aside, pending administration, for a considerable time.

*Registrar.*

The *Private Storage* (DO) is a deposit for the private effects of officers of the Museum.

*Registrar.*

The *Stationery Deposit* (DP) is a supply deposit for articles of stationery.

*Stationery Clerk.*

## LXXVII.

The officer in charge of a storage-room shall deliver packages only upon written order from the management of the Museum or in accordance with regular routine of administration.

## LXXVIII.

A record book is provided for articles assigned to general or private storage.

## LXXIX.

Effects belonging to persons not officers of the Museum may be placed in or removed from private storage only upon written order from the Director or Assistant Director.

## DEPARTMENT OF ARCHIVES.

### CLASSIFICATION OF ARCHIVES.

## LXXX.

The Archives of the Museum shall consist of the following classes of papers, printed and manuscript, to wit:

1. *The Announcement Record*.—The manuscript volumes, in which have been entered all announcements of objects forwarded to the Museum, and promises to send contributions in future.

2. *The Accession Record*.—Consisting of (*a*) the manuscript volumes (*Accession Books*) in which all accessions to the Museum are entered from day to day, in order of their reception, and (*b*) the card catalogue (*Card Catalogue of Accessions*), in which the same record is kept, arranged alphabetically under names of senders.

3. *The Record of Applications*.—The manuscript volumes in which are entered, in order of reception, all applications for specimens or other scientific material, either as gifts or loans, all proposals for exchange, &c.

4. *The Distribution Record*.—The manuscript volumes in which are entered all lots of scientific material sent away, either as gifts, loans, or exchanges.

5. *The Specimen Registers*.—Consisting of (*a*) the manuscript volumes—"Museum Catalogues"—in which the individual specimens belonging to the several sections of the Museum have been entered by the Curators of the sections under serial numbers, corresponding to those which have been indelibly marked upon the specimens themselves, and (*b*) the "Museum Register," which is kept in separate series, one in each sec-

tion of the Museum, by means of which, either (1) on catalogue cards, (2) on specially printed forms, or (3) in blank record books, arranged after the manner of a bookkeeper's ledger, a record in systematic order of the specimens is kept.

6. *The Historical File*.—Consisting of all papers, manuscript and printed, relating to the history or description of specimens or other scientific material received in the Museum—particularly letters and catalogues which may accompany any specimens or lots of specimens at the time of their reception. This file is accessory to and illustrative of the *Accession Record*, No. 2.

7. *The Application and Proposal File*.—This file is made up of all letters and other papers relating to applications, such as are entered in the Record of Applications (No. 3), and particularly lists of desiderata submitted by correspondents, and lists of duplicates in collections of correspondents, sent for use in exchange or purchase. Here also may be filed unaccepted proposals for furnishing supplies, furniture, &c., arranged, however, in a separate series.

8. *The Distribution File*.—Made up of check-lists and memoranda relating to material sent out. When an application has been fully complied with and is canceled, the papers relating thereto to be transferred from 7 to 8 and arranged with those relating to the sending of objects in response to said application.

9. *Correspondence Files*.—This to consist of (1) indexed copy-book record of letters written on Museum business, and (2) alphabetico-chronological files of letters received in connection with same.

10. *Administration Files*.—Consisting of the papers relating to the internal administration of the Museum, reports, requisitions, orders, bills, plans, contracts, registers of visitors, &c., &c.

11. *Publications relating to work of Museum, or founded upon material which is its property*.—This series of papers should be complete, arranged with special reference to convenience of consultation.

## LXXXI.

*Management of Announcement Record*.—The *Announcement Record* shall be kept by the Registrar, to whom all memoranda and letters relating to specimens or other objects announced or promised are to be given. After entering in the Announcement Book such facts as may be called for by the printed heads to the columns, these letters, &c. are to be marked with the current number of the announcement and returned, filed in serial order, until the object is received. A monthly statement of arrearages is to be furnished by the Registrar.

## LXXXII.

*Management of Accession Record*.—The *Accession Record* shall also be kept by the Registrar, who shall enter all accessions in serial order,



marking each package with its current number, prefixed by the letter "A," at the same time marking in the same manner any papers which may accompany it.

A new volume of the *Accession Book* shall be opened with the beginning of each year. The current volume shall be kept in the office of the Registrar, the back volumes in the Archive Room.

The *Card Catalogue of Accessions* is also to be kept up by the Registrar, each accession being described in writing upon the proper card, and these cards to be arranged alphabetically to serve as an index to the *Accession Book*. As soon as the list of accessions for a full year has been printed, the cards for that year shall be intercalated in their proper places in the general *Card Catalogue*, which is a complete alphabetical record of accessions from foundation of Museum to beginning of each current year.

The Catalogue for the current year is to be kept in the office of the Registrar, the General Catalogue in the Archive Room.

The current card-catalogues, as added to and amended by the curators to whom the cards are to be submitted in accordance with Rule LXIII, will serve as copy for printing the annual or other lists of accessions.

#### LXXXIII.

*Management of Record of Applications.*—The *Record of Applications* shall be kept in the office of the Assistant Director. An alphabetical index to the same will be supplied by the packets in the *Application and Proposal File*.

#### LXXXIV.

*Management of Distribution Record.*—The *Distribution Record* shall be kept by the Registrar, through whose hands, in accordance with Rule LXXII, all packages intended for shipment, and who shall retain and file as a voucher in the *Distribution File* the written orders in accordance with which each package is sent out.

An alphabetical index to the *Distribution Record*, in so far as it relates to collections distributed, will be supplied by the packets in the *Distribution File*, which is to be kept in the office of the Registrar.

#### LXXXV.

*Management of the Specimen Register.*—The *Museum Catalogues* and the *Museum Registers* belonging to each section shall be under the charge of the Curator or Acting Curator of the section, whose duty it shall be to enter, at the earliest opportunity, each specimen assigned to his department, giving it a provisional name, assigning to it a current number, which, together with name of sender and locality, are to be marked indelibly upon or permanently affixed to the specimen.

With each object or collection the Curator will receive from the Registrar a card, upon which is entered the history, so far as may be known

to him, and accompanied by such papers as may belong therewith. Upon this card the Curator is expected to inscribe a concise description of the accession lot, *returning the card and accompanying papers as soon as possible to the Registrar*, in order that the Accession Record and the Historical File may be completed and the descriptive list of accessions prepared for the printer. When a letter is sent to the sender of a specimen, giving an account of the object, a copy of this should be made by manifold process (stylograph) or upon a leaf of a letter-book, and this copy should be sent to the Registrar.

## LXXXVI.

*Management of Historical File.*—The *Historical File*, in which all papers relating to the history of objects in the Museum are to be arranged, shall be under the charge of the Registrar, in whose room shall be kept the part belonging to the current year, the main file being arranged in the office of the Assistant Director, or in the Archive Room, as may prove most convenient.

In this file should be preserved all letters (or copies of them) which relate to objects preserved in the Museum. [If necessary, index slips referring to these may be prepared, to be arranged with the files of the Smithsonian Institution.] Applications for publications should be copied on the proper blank form.

Each accession shall, if accompanied by papers, have assigned to it an envelope, in which all such papers shall be ultimately arranged. On the outside of this envelope shall be entered the *current number of the accession*, the *name of the sender*, and the *date of the accession*.

These packets to be filed serially, in order of accession numbers, in locked cases. An alphabetical catalogue to the same is supplied by the card *Catalogue of Accessions*.

Any packet or letter may be taken out for temporary use by presentation of an application slip on which the name of the applicant is signed. This slip is to be filed in place of the removed packet. Packets or letters may not be retained more than four weeks. If any paper is needed for permanent retention, a copy of it will be furnished upon application.

Only Curators or Acting Curators may be permitted to withdraw packets from the historical file.

## LXXXVII.

*Management of the Application and Proposal File.*—The make-up of the Application and Proposal File has already been defined (Rule LXXX). This file, like the *Record of Applications*, to which it serves as an alphabetical index, shall be kept in the office of the Assistant Director. The papers of this file are to be enveloped and docketed like those in the *Historical File*.

## LXXXVIII.

*Management of the Distribution File.*—The Distribution File is to be kept in the office of the Registrar. Every package sent out shall have assigned to it an envelope, upon which the address, date of sending, and nature of object sent shall be marked. These shall be arranged alphabetically, to serve as alphabetical index to *Record of Distribution*. Complete invoices of every sending consisting of more than one object shall be filed here, and the packets in this file may be removed only by order of Director or Assistant Director.

In this file, with the other papers relating the distributions, shall be kept applications which have been filled.

## LXXXIX.

*Management of Correspondence File.*—The Copy-Book Record of letters signed by the Director of the Museum shall be kept by the Corresponding Clerk of the Smithsonian Institution. In the file-room of the Smithsonian Institution shall be kept all letters not relating directly to the administration of the Museum or the history of the collections.

The Assistant Director shall keep the required record of his correspondence by copy-book and letter file, and in his letter-file may be placed letters received by the Director or other officers of the Museum relating to the actual administration of the Museum.

Curators of sections are expected to keep copy-book records of letters written by them on Museum business, the same to be at any time open to the inspection of the authorities of the Museum, and to hand in for filing in the *Historical File* letters relating to history of specimens, and in the *Correspondence Division* of the *Administration Files* letters relating to general administration which they may receive.

## XC.

*Management of Administration Files.*—The *Administration Files* shall be arranged in the most convenient manner in the office of the Assistant Director, who will, when desired, aid other officers of the Museum in consulting their contents. These files shall contain:

Reports of officers of the Museum.

Reports of collectors working for the Museum.

All records or memoranda which have been kept in the past by officers of the Museum.

Plans and specifications for cases, bottles, and all kinds of Museum supplies.

Samples of labels, stationery, blanks, bottles, locks, &c., &c., including all kinds of Museum supplies.

Contracts and proposals.

Catalogues, plans, &c., illustrating work of other museums.

Circulars and price-lists of tradesmen and manufacturers.

## DEPARTMENT OF LIBRARY.

## OBJECTS AND SCOPE OF THE LIBRARY.

## XCI.

For the convenience of the scientific staff of the Museum, a working library has been established, in which will be kept such works as are necessary for constant reference in the classification and study of the collections, and in the work of publication. In this library shall be kept all books, pamphlets, journals, maps, &c., and such of the archives of the Museum as may be there assigned.

## CENTRAL AND SECTIONAL LIBRARIES.

## XCII.

In the Central Library shall be retained all books treating of more than one subject, such as periodicals, proceedings of societies, serial reports, dictionaries, and encyclopedias, together with such monographs as are not desired in the Sectional Libraries. To each Sectional Library which may be formed, only those works may be assigned which relate directly to the work of that section only. Books in Sectional Libraries shall be considered to be personally loaned to the Curators in charge.

## ENTRIES OF BOOKS, ETC.

## XCIII.

All books and other matter shall first be entered at the Central Library, and the necessary acknowledgments made, after which monographic works, upon application, may be sent to the Sectional Libraries, their assignment being designated upon the card catalogue.

## LIMITATIONS TO THE USE OF THE LIBRARY.

## XCIV.

No person who is not a member of the scientific staff of the Museum shall withdraw books or other matter, without special written permission from the Director of the Museum. Persons taking books from the Central Library shall be responsible for the safe-keeping of the same, and shall make good any losses. They shall not be allowed to withdraw other books until those which may have been lost are restored. No one is expected to retain books longer than two weeks, unless they are in actual use. Certain works of reference may be designated, which shall upon no account be taken from the Library. All books and other matter shall be at all times subject to recall by the Librarian.

## ISSUE OF BOOKS.

## XCV.

No book shall be withdrawn from the Central Library until the applicant has filled out and signed the prescribed blank form of application or call-card. Supplies of call-cards may be obtained from the Librarian or the Registrar.

## REGULATION OF SECTIONAL LIBRARIES.

## XCVI.

Each Sectional Library shall be under the control of a Curator or Acting Curator, who shall be responsible for its safe-keeping, and who shall on no account lend the books. Books in a Sectional Library must be returned to the Central Library before they can be issued for use outside of the room to which they are accredited. The books of each Library shall be kept separate from all other books in suitable cases in the rooms of the Curator, the locks of which shall be controlled by a master-key in the hands of the Librarian, who may at any time examine them, and call the attention of the Curators to any deficiencies.

## - DUTIES OF THE LIBRARIAN.

## XCVII.

The Librarian of the Museum shall be responsible for all books, pamphlets, and periodicals belonging to the Museum, and for such of the archives as may be assigned to his care.

## DEPARTMENT OF PUBLICATIONS.

## XCVIII.

*Description of Publications.*—The Publications of the United States National Museum consist of two series, the Bulletins of the United States National Museum, and the Proceedings of the United States National Museum. These are published under the direction of the Secretary of the Interior, to whom application should be made by those who desire to obtain them.

## XCIX.

*Rules for Administration of the Publications.*—Articles intended for publication in the Proceedings of the National Museum or Bulletin of the Fish Commission must be submitted to the Director for approval.

After approval, all papers are to be given to the Editor of Proceedings and Bulletin, who will record the titles, number of pages of manuscript, number and character of illustrations, date of receiving them, giving each article a number by which it may be subsequently referred to



whenever necessary. If a paper is to have illustrations, the manuscript will not be sent to the printer until the blocks are ready to accompany it.

The Editor will forward original drawings to the engraver, receive and take charge of the blocks, and, after recording, numbering, and plainly marking the blocks, so that their place may be easily determined, he will send them to the printer. Original drawings not in actual use will be kept by the Editor and filed, so as to facilitate future reference. Plates not in use will be placed in charge of the Smithsonian Institution.

Proofs of all papers will be sent by the Public Printer to the Director, who will transfer them to the Editor for distribution to the authors to whom they belong. Each author will be responsible for the proper correction of proofs of his papers and for their return to the Editor.

Applications for extras, stating the number desired, must be made to the Director when the manuscripts are presented for approval.

The Editor will attend to the general management of the volumes, arranging title pages, prefaces, heads, numbering plates, &c., &c. He will assign a card to each article, on which will be given the serial number, copy of title, number of manuscript pages, character of illustrations, date of receipt, date of sending drawings to engraver, time of sending blocks to printer, and the various stages of progress of proofs.

### C.

*Printed List of Accessions.*—A list of the accessions to the Museum will be printed from time to time, and at the end of the year incorporated in the annual report. In connection with the list will be printed the memoranda relating to the history of each accession list, which may be worthy of presentation. This list will be prepared by the Assistant Director and Registrar, aided by the several curators.

To secure promptness and accuracy in this work it is important that the accession cards, sent with each accession list to the curator to whom it is assigned, should be filled out and returned with all possible expedition. This work should be the first and most important in the routine of each day. Otherwise the records of the Museum will be imperfect.

### CI.

*Publication Storage.*—The publications, stereotype plates, and woodcuts, property of the Museum, will be administered upon under the rules of the Smithsonian Institution, and under the direction of its Chief Clerk.

### CII.

*List of the publications.*—A list of the publications is given in Circular No. 12, and also in the Catalogue of Publications of the Smithsonian Institution; both Proceedings and Bulletin being reproduced in the Smithsonian Miscellaneous Collections.

## DEPARTMENT OF DUPLICATES AND EXCHANGES.

## CIII.

*Application for Duplicates and their Distribution.*—Applications for duplicate specimens must be made in writing, and when from domestic institutions, should be indorsed by a member of Congress. These must be approved by the Director, and after the assignment has been made, and the specimens selected, the Curator or the Registrar will attend to packing and the latter to shipment, send invoices, make the record, and attend to the necessary correspondence.

The list of applications for duplicates is provided for in the regulations of the Department of Archives.

## DEPARTMENT OF SUPPLIES.

## CIV.

*Purchase of Supplies.*—Supplies for the Museum may be obtained by a written order to the dealer or manufacturer, signed by the Director, Assistant Director, or Chief Clerk of the Smithsonian Institution, or upon indorsement of requisition by an order from the order-book, issued by the Superintendent of the Buildings. The Museum will not be responsible for the payment of bills contracted without such written order, which must be filed with the bill, if not proven paid.

Orders to the amount of over \$100 may not be made without a written agreement with, or offer from, the person from whom it is ordered.

## CV.

*Issue of Orders.*—Orders for miscellaneous supplies, such as tools and material for use by mechanics and laborers, shall be issued by the Superintendent upon the proper blanks.

The Superintendent may also issue orders for other articles, under the instructions of the Management of the Museum. No bills shall be paid unless accompanied by the official order. Bills accompanied by orders are to be examined by the Superintendent.

## CVI.

*Storage of Supplies.*—Supplies shall be stored in one of the several "depositories" provided for their reception.

## CVII.

*Requisitions.*—The Assistant Director will take action on requisitions for—

Assignment of rooms or space in exhibition halls.

The use of furniture or exhibition cases.

The services of preparators, clerks, or copyists.

The purchase of supplies.

The Registrar will act on requisitions for blanks and circulars, packing, and shipment.

The Stationery Clerk will supply articles from the stationery room on indorsement of Chiefs of Departments, a list of whom will be posted in the stationery room.

The Superintendent of Buildings will act on requisitions for—

Repairs.

Cleaning.

Services of laborers.

Regular articles of Museum supply.

### CVIII.

*Issue of Supplies and Assignment of Laborers.*—Officers of the Museum requiring supplies or the use of furniture, or other property of the Museum in the custody of the Superintendent, may obtain them by filing a requisition with that official.

If the article needed is not in stock, or of a kind not ordinarily kept in stock, the requisition must be indorsed by the Director or Assistant Director.

Requisitions must be countersigned by the chief of the special department of the Museum from which they emanate.

The Property Record shall show, under each number, the final disposition of each article.

The Superintendent shall keep an account with each Chief of Department, debiting him with property delivered to him, and crediting him with its return. Certificates of expenditures may cancel debits in this book.

Requisitions for labor or other service shall be made in a similar manner, and a book shall be kept in which each Chief of Department shall be charged with labor assigned to him.

### CIX.

*Preservation of Supplies—Inspection.*—The Superintendent shall have charge of and be responsible for the buildings and property not otherwise assigned.

He shall make a monthly examination of all furniture and fixtures, water and gas pipes, locks, window-fastenings, roofs and gutters, plugs and stop-cocks, hose, sinks, urinals, washstands and water-closets, and shall attend to the necessary repairs of the same, reporting result of inspection and his action in the premises in writing to the Assistant Director.

### CX.

*Property Record.*—The Superintendent shall receive and, when desired, receipt for every piece of furniture, implement, or article of sup-

plies, and shall catalogue every movable article in the Property Record, marking it indelibly with its entry-number and the words "U. S. National Museum."

## CXI.

*Inventory.*—The Superintendent shall make a semi-annual inventory of property (during the months of December and May), making a report to the Management upon articles destroyed, expended, or sent away.

## CXII.

*Disposal of Condemned Property.*—All property unfit for use, such as broken furniture, waste paper and metal, packing-boxes, &c., shall be delivered to the Superintendent to be disposed of under instructions from the Management of the Museum.

## CXIII.

*Property removed.*—The Superintendent shall be responsible for and take receipts for all property leaving the Museum building, for specimens removed, except under the orders of the *Registrar*, and shall allow nothing to be removed except by written permit signed by proper authority.

## CXIV.

*Jars and Bottles.*—Jars and bottles may be obtained by requisition upon the Superintendent. When possible, if large quantities of any given kind are to be needed, this requisition should be made in advance. Requisitions should be made in accordance with schedule symbols upon diagrams, copies of which may be obtained from the Registrar.

## CXV.

*Alcohol and Preservatives.*—Alcohol is stored in fire-proof vaults under the charge of the Curator of Ichthyology. Supplies are obtained by requisition upon that officer. On no account shall alcohol be issued except for use in preserving or poisoning specimens or in the work-rooms of preparators.

Other preservatives are kept in the same custody.

## CXVI.

*Exhibition Cases.*—The cases of the Museum may be designated as follows:

*Approved Patterns.*

Symbol.	Name.	Dimensions.
Case A (4.4)....	Pier uprights.....	8.6 × 4.4 × 9
A (3.3)...	Pier uprights.....	8.6 × 3.3 × 9. —
B (4.4)....	Floor uprights.....	8.6 × 4.4 × 7.
B (3.3)....	Floor uprights.....	8.6 × 3.3 × 7.

Symbol.	Name.	Dimensions.
C (1.3)....	Door screens .....	8.6 × 1.3 × 7.
C (2.2)....	Door screens .....	8.6 × 2.2 × 7.
D (1.3)....	Sliding screens .....	8.6 × 1.3 × 7.
D (2.2)....	Sliding screens .....	8.6 × 2.2 × 7.
E	.... Flat screens .....	
F $\frac{1}{2}$	.... Fold screens, half pillar...	
F	.... Fold screens, whole pillar .	
G	.... Slope screens .....	
H	.... Table uprights .....	
I	.... Unit tables .....	
J $\frac{J}{2}$ $\frac{J}{4}$	.... Unit drawers .....	
K	.... Unit boxes .....	
L	.... Wall uprights .....	
M	.... Salvin bird-cases .....	
N	.... Gothic alcoves .....	
O	.... Basement drawer-storages .	
P	.... Sectional library cases ....	
Q	.... Standard shelf-stacks .....	
R	.... Standard pigeon-hole stacks	
S	.... Quarter tables .....	

*Appliances.—(Special.)*

Gavit side brackets.	Jenks link locks.
Gavit side racks.	Segment hinges (for fold
Gavit front brackets.	screens.)
Gavit front racks.	Unit box clips.
Jenks rack locks (with or	
without Yale lock).	

Drawings and samples of cases and appliances may be found in the office of the Assistant Director.

CXVII.

*Blanks.*—The following blanks, intended for the use of officers and employees, may be obtained by requisition upon the Registrar:

Museum Catalogues.

Invoice Sheets (for collectors). Museum Register Sheets. Property Record.

Library Catalogue Cards.

Library Call Cards.

Museum Catalogue Cards.

“Memorandum” pads.

“Order for work” pads.

“Shipment Memorandum” pads.

“Requisition for Supplies” pads.

Preparator's Record.

Preparator's Memorandum.

Stylograph Books.

Monthly Report blank.



## DEPARTMENT OF ACCOUNTS.

## CXVIII.

*Preparation of Vouchers and Disbursements.*—All accounts will be administered under the direction of the Chief Clerk of the Smithsonian Institution, and all payments made from his office.

The Museum will not be responsible for the payment of any bills contracted without a written order from the Director or Assistant Director or Chief Clerk of the Smithsonian Institution.

Orders are to be returned by the party furnishing the article required, with the cost stated, and the receipt of the person to whom it was delivered.

Bills presented are to be examined by the Accountant, to see that the calculations are correct and the voucher in proper form, prices reasonable, and the articles delivered.

The payment of bills is to be made between the twenty-fifth and the last day of each month, and of salaries on the last day of the month.

Cash from sales of old material, publications, postage-stamps, &c., to be deposited with the Accountant.

The amount required to pay bills in foreign countries is to be ascertained by the Accountant, and the statement of the bank as to cost to be kept with the voucher.

A statement is to be made to the Director monthly of the receipts and expenditures, and of all contracts and agreements involving expenditure.

## CXIX.

*Certification and Approval of Accounts.*—Accounts must be certified to by the Assistant Director or other officer designated by the Director, and must be approved by the Director or Secretary of the Smithsonian Institution.

## CXX.

## INSTRUCTIONS FOR MAKING OUT ACCOUNTS.

1. Vouchers must be signed in ink, and by the person in whose name the account is made—not “per” any agent or clerk—and the amount expressed both in writing and figures.

2. The signature should be at the bottom of the page, and should correspond with the name of the individual or company, at the head of the account. Signature by *agent* will not answer; *it must be by the principal*. Nothing should be written on the blanks excepting the signature. Any vacant spaces will be filled up in this office when payment is made.

3. Evidence of authority to sign vouchers for incorporated or unincorporated companies must accompany accounts. Such evidence should be in the form of an extract from the by-laws or records of the company or association, showing the authority of the officer to receive and receipt for moneys for the company, and giving his name and the date of his election and appointment, which extract must be verified by a certifi-

cate, under seal, signed by the president or secretary, or by one of these officers, and not fewer than two of the directors, which certificate must state that such authority remains unrevoked and unchanged.

If the company have no seal, the extract should be certified as correct by a notary public or other competent officer under his seal.

4. Signatures by mark must be witnessed. If John Smith has a bill and he is unable to write his name, it should be written for him, and then he should place his mark—thus: John <sup>his</sup> + Smith. Witness: David O'Neill.  
mark.

5. Accounts for traveling expenses should give the places of departure and destination, supported by sub-vouchers, such as hotel bills, &c. Each day's expenses should be mentioned under its date.\*

6. Hotel bills should give the dates of arrival and departure and the rate per day. Thus a person arriving before breakfast June 20, and leaving after dinner June 24, will have been at the hotel four and a half days, which, at \$3 per day, would amount to \$13.50, and should so express it in the account.

7. Vouchers for supplies must be in detail, showing the nature, quantities, and *rates*, as well as the amount, namely: 5 pounds nails, at 5 cents, 25 cents.

8. Accounts for service must give the dates, stating whether inclusive or not, between which such service was performed, and the rate of pay, thus: A man employed from June 28 to July 10, inclusive, would have served 13 days, which, at \$1.50 per day, would amount to \$19.50.

9. Accounts involving sub-vouchers, some or all of which, for good reasons, cannot be furnished, must be signed by the party, and affidavit made before a notary public or justice of the peace that the account in question is correct.

The seal of the officer before whom an account is sworn should be affixed.

## DEPARTMENT OF BUILDINGS AND LABOR.

### CXXI.

*Duties of Superintendent.*—The Superintendent of Buildings shall be responsible for the policing of the buildings and the conduct of the mechanics and laborers.

*Laborers and Mechanics.*—He shall direct the work of all mechanics, laborers, messengers, and other employees of the Museum, and shall keep a *time-book*, in which shall be recorded their time of service, the nature of the work performed, and the rate of pay, reporting to the *disbursing officer* monthly, or at the close of the service of any individual.

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\*To this must be added the following certificate: "This account is correct and just, and the items of expenses are verified from memoranda kept by myself, and no part of said travel was under a pass."

*Details of Workmen.*—Workmen may be detailed by him for special service upon the presentation of proper *requisitions*.

*Lost and Found Record.*—He shall keep a "Lost and Found Record," and attend to the identification of claimants and the restoration of articles found in the Museum.

*Tools.*—He may issue tools to workmen, holding them responsible for their safe return.

#### CXXII.

*Duties of Assistant Superintendents.*—The Superintendent shall have two assistants—one in each building. The assistant in the Museum building shall have especial charge of records and the property storage, and in the absence of the Superintendent perform his duties. The assistant in the Smithsonian building shall have charge of that building and the property it contains, and shall report all needful action to the Superintendent. The assistants may not deviate from routine except by special order.

#### CXXIII.

*Duties of Electrician.*—The Electrician shall inspect and keep in proper running order all telephones, burglar-alarms, electric clocks, watch-clocks, and other electric apparatus generally, and such other as may be placed in his charge.

#### CXXIV.

*Duties of Engineer.*—The Engineer shall have charge of all boilers, heating-apparatus, water-pipes, and gas-pipes, making weekly inspections and keeping them in repair; he shall be responsible for their working; he shall inspect monthly and record the readings of all gas-meters; he shall attend to the inspection, reception, and storage of wood and coal, under the direction of the Superintendent, and shall report deficiencies at least a week in advance; he shall attend to the removal of ashes, giving to the cartmen the regulation tickets, one for each load, which they present to the Superintendent in claiming payment; he shall make repairs of locks, water and gas fixtures, &c., as may be ordered by the Superintendent.

#### CXXV.

*Duties of Assistant Engineer.*—An Assistant Engineer shall have charge of and be responsible for the heating apparatus in the Smithsonian building, under the supervision of the Engineer.

#### CXXVI.

*Duties of Firemen.*—The Firemen work under the direction of the Engineer, and one of them shall, when necessary, serve as blacksmith.

## CXXVII.

*Duties of Carpenter.*—The Carpenter shall work under the direction of the Superintendent. Extra carpenters may be employed by the Superintendent when so instructed.

## CXXVIII.

*Duties of Inspectors.*—The Inspectors shall have their beats assigned them by the Superintendent. They shall be responsible for the safety of property within their beats, and shall report cases of damage; they shall see that the Museum rules relating to visitors are enforced, preventing smoking and disorderly conduct and reporting irregularities; they shall deliver all articles found in the Museum to the Superintendent's office.

The Inspectors shall answer the questions of visitors and serve as guides as far as possible without conflict with other duties and without leaving their beats.

They shall receive no fees, under penalty of discharge.

The Inspectors constitute the *first watch*, and shall continue on duty till relieved by the *second watch*.

## CXXIX.

*Duties of Watchmen.*—The Watchmen shall be responsible for all property under their care. When going upon duty they shall (1) examine all doors and windows; (2) satisfy themselves that there are no strangers in the building; (3) see that the *fire-plugs* are in order for use.

They shall visit each record station every hour and make the proper record with the clock; any failures to do this must be strictly accounted for. When relieved, the Watchman is to report to the next watch any irregularities or suspicious circumstances he may have observed.

All signals and telephone calls to be answered without delay, and emergencies to be announced by the code signals.

Watchmen shall remain upon duty until regularly relieved. The Watchmen who admit the workmen shall keep their time-record.

## CXXX.

*Duties of Janitors.*—Janitors stationed at the public entrances shall be in their places at the sound of the signal for opening, and shall not leave during the hours of exhibition. They shall refuse admission to disorderly persons and children without guardians. Canes, umbrellas, parasols, baskets, and bundles shall be retained at the door and checks given for the same. No bundles shall be taken from the building without properly signed permits, which must be filed. No fees shall be received under penalty of discharge. Dogs shall be excluded by the janitor.

The Janitors shall record daily the readings of the automatic enumerators.

Janitors stationed at the entrance to offices shall answer questions and prevent intrusions.

## CXXXI.

*Duties of Messengers.*—Dispatch messengers shall report at the Superintendent's office, and may be summoned by signal.

Office Messengers shall be sent away from the buildings only upon special service.

## CXXXII.

*Duties of Cleaners.*—Cleaners shall have their work assigned them by the Superintendent. The work shall be done before 9 a. m.

## CXXXIII.

*Duties of Laborers.*—Laborers shall work under the direction of the Superintendent or other officers who make requisition for their services. They shall report, when out of work, to the Superintendent or his assistants.

## CXXXIV.

*Outside Workmen.*—Mechanics and laborers employed by the day shall report each day at the Superintendent's office, before beginning and after ending work, otherwise their claims for payment may be disallowed.

## CXXXV.

*Hours of Work.*—Workmen, unless otherwise ordered, serve from 7.30 a. m. to 4.30 p. m.

Janitors serve from 8.30 a. m. to 5 p. m.

Watchmen and inspectors serve according to special schedule.

Outside workmen serve according to agreement.

Workmen report to watchmen on duty at entrance door.

## CXXXVI.

*Opening and Closing Museum.*—The hours of opening and closing the Museum, and the beginning and end of noon recess, will be announced by signal from Superintendent's office.

The outer doors of the Smithsonian and Museum buildings must be locked at the time of their closing to the general public, and no one allowed to enter by means of pass-keys. A watchman will be in attendance to open the doors when summoned.

## CXXXVII.

*General Rules.*—The following general rules will be enforced by the Superintendent:

The exhibition halls are open to the public from 9 a. m. to 4.30 p. m. every day in the year, except Sundays.



The doors shall be permanently closed at 5 p. m.

The business offices are open from 9 a. m. to 4 p. m.

The work-rooms and shops are open from 7.30 a. m. to 4.30 p. m.

No smoking will be allowed in the public halls.

No dogs will be admitted to the exhibition halls.

Canes and packages will be deposited with the janitor.

Employees of the Museum are forbidden under penalty of discharge to receive fees from visitors.

#### CXXXVIII.

*Access to the Building after Office Hours.*—After the buildings are closed in the afternoon, and until the hour of opening, the watchmen are forbidden, under penalty of dismissal, to allow to remain, or to enter, any persons whose names are not upon the lists furnished them, or who are not provided with a properly certified pass. This rule applies to Sundays and other days when the Museum is closed. No exceptions can be made in favor of friends of the watchmen.

The main entrance of the Museum building will be kept closed except during hours of public admission, and access to the building can be gained only by ringing the bell at the entrance to the Northwest pavilion. Every person admitted to the building, when closed, shall register his name upon a special record kept for the purpose, and the watchman is required to note opposite his name the hours of his admission and departure. When a person whose name is on the list is accompanied by a friend, he must sign his own name underneath that of his friend preceded by the words "Introduced by."

#### CXXXIX.

*Removal of Property.*—No Museum property shall be removed from the buildings except upon the presentation of a written order signed by the Director of the Museum, the Assistant Director, or the Chief Clerk of the Smithsonian Institution.

The Janitors shall be instructed to detain packages, unless the bearer presents a permit signed by some officer whose name is on his permit-list. These permits shall be filed.

These rules do not apply to boxes and packages leaving the buildings under the management of the Registrar.

#### CXL.

*Approvals.*—Requisitions for supplies shall require the approval of the chief of the department for which they are needed.

The written indorsement of the Director or the Assistant Director shall be necessary before proceeding with—

- (1.) Any changes in arrangement or decoration of the buildings.
- (2.) Any changes in the use or occupancy of apartments.

- (3.) Any changes in the duties of Museum employés, except those of low grade.
- (4.) Any changes in the installation of cases or other objects in the exhibition halls.
- (5.) Any changes in the color or internal arrangement of cases.
- (6.) Any changes in the installation of collections in the exhibition halls or the removal of objects.
- (7.) The making of cases, pedestals, trays, labels, blank forms, or any other fixtures or appliances of general Museum administration.
- (8.) Any temporary deviation from the provisions of the rules in the general orders.
- (9.) Memoranda and requisitions referring to any of the above topics may be filed with the Superintendent of Buildings, with the Assistant Director, or with the Director. They must not be acted upon until properly indorsed.

#### DEPARTMENT OF ELECTRIC SERVICE.

##### CXLI.

*Apparatus.*—The following is a description of the apparatus in the Electric Room of the National Museum: One 50-drop annunciator with 29 telephone connections, of which 9 are connected with telephones in the Museum building, 11 in the Smithsonian building, and 9 to instruments at various outside points, including the central office of the telephone exchange, through which connection may be had with any part of the city; one 100-drop annunciator to which are connected 300 windows and 85 doors throughout the Museum building; one 81-drop annunciator connected with the doors of the exhibition cases; one large watch clock for recording on paper dials the alarm signals which the watchman turns in from the twelve o'clock stations throughout the building as he makes his patrol; and one District telegraph alarm box. In the Smithsonian building there are nine clock stations, controlled in the same manner as those in the Museum building, and also a special telephone connection with the city.

##### CXLII.

*Duties of Telephone Clerk.*—The Telephone Clerk is on duty from 8 o'clock a. m. to 4 o'clock p. m., and is to answer all calls promptly, and under no circumstances is the Telephone Room to be left unattended. A record is to be kept of all calls, giving the names of both the persons calling and called, and also of the exact time the call was made.

##### CXLIII.

*Duties of Watchman in Telephone Room.*—The watchman on duty in the telephone room is required to answer all telephone calls, and to notify the watchmen in the building of signals on the burglar annunciator. He is also required to turn in a signal to the night-watch at the

District Telegraph Office every hour from 5 p. m. to 8 a. m. In case of neglect to do this a messenger is immediately sent to the Museum to ascertain the cause, and the fact is reported to the Superintendent the next morning.

## CXLIV.

*Duties of Watchman on Patrol.*—The watchman making the rounds of the building, which duty occupies exactly an hour, is required to turn in an alarm at each of the twelve stations. The time and place are registered on paper-dials which are kept on file in the Superintendent's office and renewed daily.

## CXLV.

*Signals.*—Signals may be made from the Electric Room upon signal bells in various parts of the building. These signals may be answered by persons upon the push-buttons, of which there are seventy-eight in the building, and the location of which is indicated by a white star. The code of signals being for the private use of the officers of the Museum, should be kept secret. The code for whistle signals is the same as that for bell signals.

## DEPARTMENT OF PREPARATION.

## CXLVI.

*Preparators' Records.*—Each Preparator must keep a record book in which to enter the name and catalogue number of each article passing through his hands, with statement of character of work done upon it and length of time devoted to it, name of person from whom received and to whom delivered, with dates.

## CXLVII.

*Instructions to Preparators.*—Each object sent to a Preparator must be accompanied by a memorandum giving its catalogue number and name, and with definite instructions as to character of work to be done, and to whom to be delivered.

## CXLVIII.

*Importance of Memoranda.*—Preparators should insist upon having such memoranda, and will be held accountable for failure to obtain them.

## CXLIX.

*Duties of Photographer.*—The Photographer is subject to the rules governing the action of Preparators. He shall take such photographs as he may receive written instructions for, and shall keep a perfect record of the negatives, property of the Museum, under his charge. Also one copy of each photograph he makes, arranged in suitable books in chronological order. He shall report monthly all work done for the Museum. He shall make requisition for such supplies as are necessary for the prosecution of Museum work.

## APPOINTMENTS, LEAVES OF ABSENCE, ETC.

## CL.

*Applications.*—All applications for positions must be made in writing. Applications, with the accompanying letters of recommendation, are to be filed in the office of the Chief Clerk of the Smithsonian Institution.

## CLI.

*Appointments.*—A letter of appointment, stating salary, terms of tenure, duties, &c., signed by the Director of the Museum, will be given each appointee. Appointments to grades lower than grade VI are made with the understanding that they are subject to recall at the end of each fiscal year.

## CLII.

*Promotions.*—Except in cases where the duties of an employé are changed to such an extent as to add greatly to the responsibility of his position, promotions can only be made at the beginning of each fiscal year. With each promotion a new letter of appointment will be issued by the Director.

## CLIII.

*Discharges and Suspensions.*—Any appointment may be canceled at the discretion of the Director. No discharge is valid until the person discharged has been notified by a formal letter of discharge signed by the Director. Suspension of pay may be made subject to the approval of the Director.

## CLIV.

*Leaves of Absence.*—Unusual leaves of absence and vacation of officers of the scientific staff be arranged by the Director. The ordinary vacations of preparators, mechanics, and administrative employés will be arranged by the Assistant Director, subject to the approval of the Director; those of laborers and cleaners by the Superintendent of the Buildings, subject to the approval of the Assistant Director.

## CLV.

*Temporary Employment.*—Laborers, mechanics, and copyists may be employed by the day at the discretion of the Assistant Director, in carrying out plans approved by the Director.

## CLVI.

*Record of Appointments, &c.*—A copy of each letter of appointment, promotion, or discharge shall be filed at once in the office of the Chief

Clerk of the Smithsonian Institution. On or before the 20th of each month a statement of the names and rates of compensation of each person temporarily employed during the month shall be submitted to the Chief Clerk of the Smithsonian Institution. Daily memoranda of action shall be submitted.





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SMITHSONIAN INSTITUTION.

UNITED STATES NATIONAL MUSEUM.

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No. 2.

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**CIRCULAR ADDRESSED TO FRIENDS OF THE MUSEUM.**

The new Museum building is now finished, and the installation of the collections within its walls is being carried on as fast as exhibition cases can be built. The large additional space now available for the display of specimens renders it practicable for the officers of the Museum to carry out the long cherished plan of making it an educational exhibition of the most useful kind.

Few persons realize what a wealth of material is stored away in the vaults and attics of the Smithsonian building and the "Armory," which has been used as a deposit since 1876, in addition to the exhibits of the thirty or more foreign governments, given to the United States at the end of the Philadelphia Exposition, there is a still greater bulk of valuable material obtained then and since from private and State exhibitions made upon the same occasion.

Still more important are the collections made for that occasion by the Fish Commission and the Smithsonian Institution, and by the various agencies of the latter during the past twenty years, and which, for lack of room, have never been publicly exhibited.

In the new building will be concentrated all the industrial collections, and all the ethnological specimens, except the reserve series of pre-historic stone implements. In the old building will be kept those collections which are most important as material for purely scientific investigation, such as the main collection of birds, the fishes, and reptiles in alcohol, the marine invertebrates, &c. The new building will, however, contain the collections in economic natural history.

The collections in the new building are intended to form an *Anthropological Museum*, organized upon the broadest and most liberal interpretation of the term "anthropology," and illustrating the characteristics of civilized as well as savage races of mankind and their attainments in civilization and culture. The central idea will be *man*, and the manner in which he adapts the products of the earth to his needs. All useful and noxious animals, plants, and minerals will be shown, industries by means of which they are utilized—by both method and finished product—and finally, the various objects which men use for any purpose whatever. *A place is provided for every object which has a name.*

A thorough system of descriptive labels and guide-book manna's is provided for. No specimen will be exhibited which is not so thoroughly explained by its label that its significance may be understood by any intelligent visitor.

With this scope and this method of exhibition, the Museum will be of

greater educational value than any similar museum heretofore organized, since a single series of selected objects will replace the numerous partial series such as are seen in every industrial fair. The arrangement of these in a philosophical manner will add greatly to their significance.

In displaying and labeling the objects in the Museum its officers are striving to profit by the experience of all the best museums of Europe, which have been visited and carefully studied with this end in view.

In certain departments the National Museum is already richer than any other, notably in the ethnology of the native races of America, the zoology of the United States, the department of animal products, the department of fisheries, that of building stones, and that of North American ores.

In other sections, by the coöperation of prominent experts and business houses, collections are being made with much thoroughness. For instance, the materia medica collection is in charge of Schieffelin & Co., of New York, who are sparing no pains or expense in making it complete; F. W. Devoe & Co. are doing the same thing for paints and pigments; H. K. and F. B. Thurber for food products; Powers & Weightman, of Philadelphia, for chemical products used in the arts, &c. Mr. Edward Atkinson, in connection with his census investigations on the cotton industries, has gathered for the Museum a complete series of the cotton fabrics made in the United States, and the Department of State has deposited the large collection of cotton fabrics of foreign countries, gathered by its agents for the Atlanta Cotton Exposition.

It is the policy of the Museum to enlist the aid of some prominent expert, or some leading business house, in making up the display for each special industry. It has been very gratifying to find that all who have as yet been invited to help have willingly and enthusiastically complied.

It is hoped that the possessors of valuable private collections may find it to their interest to deposit them in the National Museum, and to bring about this result the authorities of the Museum have an additional incentive to make the display of articles in their custody as attractive as possible.

In arranging for the reception of collections, the Museum agrees to furnish exhibition cases, and also bottles and such other accessories for mounting as are necessary for the most effective display.

Each individual object will have a conspicuously printed label, upon which will be placed the name of the donor, which will also be published in all catalogues and other publications of the Museum in which they are referred to.

The Museum will pay transportation charges on collections sent.

Contributors are requested to supply all available information regarding specimens which they may send.

SPENCER F. BAIRD,

*Secretary Smithsonian Institution, and Director U. S. National Museum.*

JANUARY 1, 1882.

[Proceedings United States National Museum, 1881. Appendix.]

SMITHSONIAN INSTITUTION.  
UNITED STATES NATIONAL MUSEUM.

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No. 3.

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**CIRCULAR IN REFERENCE TO PETROLEUM COLLECTIONS.**

MY DEAR SIR: Prof. S. F. Peckham, of Providence, R. I., has been requested by myself to collect and arrange for exhibition a suite of specimens of petroleum which will illustrate the occurrence of that important substance in the United States. Will you render him such assistance as you may be able, and oblige,

Very truly yours,

S. F. BAIRD,  
*Secretary Smithsonian Institution,  
and Director United States National Museum.*

WASHINGTON, D. C., *January 1, 1882.*

---

MY DEAR SIR: Will you please send me a sample of petroleum by  
express from \_\_\_\_\_

---

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Please send at least a quart. Will you also fill out and sign the certificate hereto attached as fully as you may be able.

Very respectfully,

The accompanying specimen of petroleum, furnished the National Museum at Washington, occurs as follows:

State,

County,

Township,

Farm,

Lease,

Number or name of well,

Depth of well,

When drilled (completed),

Oil in sand,

Oil in crevice,

First, second, or third sand?

Thickness of sand,

Pebble or fine sand,

Yield of well on first day of flow, bbls.,

Yield of well on first day of pumping, bbls.,

Was the well torpedoed?

Sp. gr. of oil,

Geological formation *from which the oil came*,

Address of donor.

SMITHSONIAN INSTITUTION.

UNITED STATES NATIONAL MUSEUM.

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No. 4.

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**CIRCULAR CONCERNING THE DEPARTMENT OF INSECTS.**

Prof. C. V. Riley has deposited in this Museum his extensive private collection of insects. The collection comprises some 30,000 species and upward of 150,000 specimens of all orders, and is contained in some 300 double folding-boxes in large book form and in two cabinets of 80 glass-covered drawers. The specimens are all in admirable condition, and the determined species duly labeled and classified. The collection is chiefly valuable, however, for the large amount of material illustrating the life-histories, habits, and economy of species, 3,000 of which are represented in one or all of the preparatory states, either in liquid in separate boxes, or blown and mounted dry with the imagines. Fifteen blank books are filled with notes and descriptions of these species, most of them yet unpublished. Though several special collections surpass it in a single order, few, if any, general collections of North American insects equal it, and perhaps none from the biological point of view.

The Museum is now prepared to properly care for such collections, under direction of Professor Riley, who has been appointed honorary curator of insects, and it is hoped that in time, with so good a beginning, a truly national exposition of the insect fauna of the country will be brought together. The Museum building is entirely fire-proof, and there is every facility for the safe preservation of specimens or collections that may be donated. I would especially request that correspondents send the adolescent states in connection with mature forms whenever possible, together with all material exemplifying the transformations, architecture, and economy of species. I would also invite those engaged in descriptive entomology to deposit in the Museum types or duplicates of their described species, it being my intention not only to build up a systematic national collection that students may profitably consult, and which will be kept in secure cabinets to be used only by such students, but to have in connection therewith a more popular exhibit for the instruction and edification of the public.

SPENCER F. BAIRD,  
*Secretary Smithsonian Institution,  
and Director United States National Museum.*

JANUARY 1, 1882.





SMITHSONIAN INSTITUTION.

UNITED STATES NATIONAL MUSEUM.

No. 5.

ESTABLISHMENT AND OFFICERS.

MEMBERS (EX-OFFICIO) OF THE SMITHSONIAN INSTITUTION.

---

CHESTER A. ARTHUR, President of the United States.....	<i>Presiding Officer, ex-officio.</i>
MORRISON R. WAITE.....	<i>Chief Justice of the United States.</i>
FREDERICK T. FRELINGHUYSEN.....	<i>Secretary of State.</i>
CHARLES J. FOLGER.....	<i>Secretary of the Treasury.</i>
ROBERT T. LINCOLN.....	<i>Secretary of War.</i>
WILLIAM H. HUNT.....	<i>Secretary of the Navy.</i>
SAMUEL J. KIRKWOOD.....	<i>Secretary of the Interior.</i>
TIMOTHY O. HOWE.....	<i>Postmaster-General.</i>
BENJAMIN F. BREWSTER.....	<i>Attorney-General.</i>
EDGAR M. MARBLE.....	<i>Commissioner of Patents.</i>

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REGENTS OF THE INSTITUTION.

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MORRISON R. WAITE, Chief Justice of the United States .....	<i>Chancellor.</i>
GEORGE F. HOAR, (of Worcester, Mass.) ....	<i>Member of the Senate of the United States.</i>
NATHANIEL P. HILL, (of Denver, Colo.).....	<i>Member of the Senate of the United States.</i>
SAMUEL B. MAXEY, (of Paris, Texas).....	<i>Member of the Senate of the United States.</i>
NATHANIEL C. DEERING, (of Osage, Iowa).....	<i>Member of the House of Representatives.</i>
EZRA B. TAYLOR, (of Warren, Ohio) .....	<i>Member of the House of Representatives.</i>
SAMUEL S. COX, (of New York City) .....	<i>Member of the House of Representatives.</i>
JOHN MACLEAN, (of Princeton, New Jersey) ....	<i>Professor in the College of New Jersey.</i>
PETER PARKER, (of Washington.)	
WILLIAM T. SHERMAN, (of Washington).....	<i>General of the Army of the United States.</i>
ASA GRAY, (of Cambridge, Mass.).....	<i>Professor in Harvard University.</i>
HENRY COPPÉE, (of Bethlehem, Pennsylvania) .....	<i>Professor in Lehigh University.</i>
NOAH PORTER, (of New Haven, Connecticut).....	<i>President of Yale College.</i>
PETER PARKER,	}..... <i>Executive Committee of the Board of Regents.</i>
JOHN MACLEAN,	
WILLIAM T. SHERMAN,	

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OFFICERS OF THE INSTITUTION.

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CHESTER A. ARTHUR, President of the United States .....	<i>Ex-officio Presiding Officer.</i>
MORRISON R. WAITE, Chief Justice of the United States .....	<i>Chancellor of the Institution.</i>
SPENCER F. BAIRD.....	<i>Secretary of the Institution.</i>
WILLIAM J. RHEES .....	<i>Chief Clerk of the Institution.</i>

## OFFICERS OF THE NATIONAL MUSEUM.

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SPENCER F. BAIRD, *Secretary of the Smithsonian Institution : Director of the Museum.*

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G. BROWN GOODE.....*Assistant Director : Curator, Department of Arts and Industries.*

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TARLETON H. BEAN .....*Curator, Department of Fishes.*  
 WILLIAM H. DALL.....*Honorary Curator, Department of Mollusks.*  
 FREDERICK P. DEWEY.....*Assistant, Department of Minerals and Economic Geology.*  
 JAMES M. FLINT.....*Honorary Curator, Section of Materia Medica.*  
 J. HOWARD GORE.....*Honorary Curator, Section of Foods.*  
 GEORGE W. HAWES.....*Curator, Department of Minerals and Economic Geology.*  
 RICHARD RATHBUN.....*Curator, Department of Marine Invertebrates.*  
 CHARLES RAU.....*Curator, Department of Antiquities.*  
 ROBERT RIDGWAY.....*Curator, Department of Birds.*  
 CHARLES V. RILEY.....*Honorary Curator, Department of Insects.*  
 R. W. SHUFELDT.....*Honorary Curator, Section of Bird Skeletons.*  
 ROBERT E. C. STEARNS.....*Assistant, Department of Mollusks.*  
 FREDERICK W. TAYLOR.....*Chemist.*  
 FREDERICK W. TRUE.....*Librarian : Curator, Department of Mammals.*  
 LESTER F. WARD.....*Honorary Curator, Department of Fossil Plants.*  
 CHARLES A. WHITE.....*Curator, Department of Fossil Invertebrates.*  
 HENRY C. YARROW.....*Honorary Curator, Department of Reptiles.*

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STEPHEN C. BROWN.....*Registrar.*  
 HENRY HORAN.....*Superintendent of Buildings.*  
 JOSEPH PALMER.....*Chief Modeler.*  
 WILLIAM T. HORNADAY.....*Chief Taxidermist.*

JANUARY 1, 1882.

# SMITHSONIAN INSTITUTION.

## UNITED STATES NATIONAL MUSEUM.

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No. 6.

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### CLASSIFICATION AND ARRANGEMENT OF THE MATERIA MEDICA COLLECTION.

By **JAMES M. FLINT**, Surgeon, U. S. Navy.

---

#### PRIMARY DIVISIONS.

I. Inorganic Materia Medica.

II. Organic Materia Medica, { 1. Vegetable products.  
2. Products of fermentation and dis-  
tillation.  
3. Animal products.

#### I.

Medicines of the Inorganic Division to be classified according to their fundamental elementary constituents, following the order of the elements, given in Roscoe and Schorlemmer's Treatise on Chemistry.

With each elementary substance, to be arranged—

1. The chemical compounds of that element used in medicine and pharmacy.

2. The preparations of which that element, or any of its compounds, constitutes the fundamental ingredient.

These preparations to include—

*a.* The official preparations of the United States Pharmacopœia.

*b.* The official preparations of foreign Pharmacopœias which are not recognized by the United States Pharmacopœia.

*c.* Unofficial preparations which are considered to be of sufficient importance or interest to be worthy a place in the collection.

Poisonous salts, liable to be mistaken, on account of similarity of appearance, for those less active, should be shown with the latter also.

#### II.

1. Vegetable products to be classified according to the botanical affinities of the plant from which derived, following the sequence given in Bentham and Hooker's Genera Plantarum, beginning with the lowest order.

Under each natural order to be arranged—

Proc. Nat. Mus. 81—35 (545)

A. The official drugs derived from each plant of that order.

B. Drugs not official in any Pharmacopœia, but which are or have been used in medicine.

With each crude drug to be displayed—

a. A colored plate of the plant from which it is derived, with figures illustrating its botanical characters.

b. A specimen of the flowering plant, pressed and dried, in the usual manner of an herbarium.

c. The drug in all its varieties, commercial and botanical. These specimens primarily should be fair commercial samples, such as will honestly represent the article as found in the market. They may be supplemented by carefully selected, or rare samples, or by those adulterated or possessing interesting peculiarities of any kind. The commercial and botanical sources of each should be authenticated. The practical value of the collection will largely depend upon the completeness and accuracy of this portion of the exhibit.

d. Sections of roots, stems, barks, etc., to show structure, fracture, or other physical characters that may assist in their identification, with drawings of the same, magnified, if necessary.

e. Preparations, official and other, of which the drug or any product of the drug constitutes the fundamental ingredient.

2. Products of fermentation and distillation will include the products of the acetons and vinous fermentations, and the derivatives, chloroform, ether, etc., as well as distillates, such as carbolic acid, pyroligneous acid, etc.

3. Medicines of animal origin to follow the usual classification of the animals from which the crude drug is obtained.

Each group of specimens, arranged under one head, to have a descriptive card, giving in brief terms the most important facts relating to general character, source, commercial varieties, etc.

Each specimen to have its label, giving scientific and vernacular names, and such special information as can be condensed within the prescribed limits.



## SMITHSONIAN INSTITUTION.

## UNITED STATES NATIONAL MUSEUM.

No. 7.

**A CLASSIFICATION OF THE FORMS IN WHICH DRUGS AND MEDICINES APPEAR, AND ARE ADMINISTERED.****By JAMES M. FLINT, Surgeon, U. S. Navy.**

The following classification has been prepared as the basis of a special exhibit in the Materia Medica section of the National Museum, illustrative of the forms in which medicinal substances appear in commerce, or are prepared for administration by the pharmacist.

The exhibit is intended to illustrate this classification by actual specimens, which shall be, as nearly as possible, representatives of their respective classes. The list of examples is provisional only, and subject to such modifications as a larger experience may suggest.

The effort has been made so to condense each definition that it may be conspicuously printed on the label of the jar or bottle containing the specimen, together with the name of the latter.

## CLASSIFICATION OF MEDICINAL FORMS.

## I.—CRUDE VEGETABLE DRUGS.

		Examples.
<b>Radices.</b> (Roots.)	The descending axes of plants, never developing leaves, and having for their function the absorption of nutriment from the soil.	Senega. Ipecac.
<b>Rhizomata.</b> (Rhizomes.)	Subterranean stems, consisting of a succession of joints, developing leaves in the form of scales, and producing axillary buds.	Galangal. Spigelia. Solomon's Seal.
<b>Tubera.</b> (Tubers.)	Thickened, fleshy underground stems, or branches, bearing rudimentary leaf buds.	Jalap.
<b>Bulbi.</b> (Bulbs.)	Very short subterranean stems covered with leaves or the bases of leaves in concentric layers, and producing roots from below.	Garlic. Onion.
<b>Cormi.</b> (Corms.)	Very short subterranean stems bearing buds on the upper surface and producing roots from below. Distinguished from bulbs by the absence of foliate structure.	Colchicum.
<b>Ligna.</b> (Woods.)	The solid portions of the stems of exogenous plants, as distinguished from barks and piths.	Guaiacum.

*Classification of medicinal forms—Continued.*

## I.—CRUDE VEGETABLE DRUGS—Continued.

		Examples.
<b>Cortices.</b> (Barks.)	The covering of the stems and roots of exogenous plants, outside of the wood.	Oak. Cinnamon.
<b>Medulæ.</b> (Piths.)	The cellular central portion of exogenous stems.	Sassafras pith.
<b>Herbæ.</b> (Herbs.)	Plants which die, to the ground at least, after ripening the seed or on the approach of winter. In commerce comprises those drugs which consist of the whole herb, or of the stems, leaves, and flowering tops of herbs.	Absinth.
<b>Stipites.</b> (Stems.)	The stalks and branches of herbs deprived of leaves, flowers, and fruit.	Dulcamara.
<b>Summitates vel Cacumina.</b> (Tops.)	The small terminal branches of plants.	Savin.
<b>Gemmæ vel Turi- ones.</b> (Buds.)	Branches or leaves in their earliest or undeveloped state.	Balm of Gilead Buds Poplar Buds.
<b>Folia.</b> (Leaves.)	The green deciduous organs of plants formed by expansion of the bark at the nodes of the stem.	Buchn. Jaborandi.
<b>Flores.</b> (Flowers.)	The organs of reproduction of phenogamous plants.	Santonica. Orange. Arnica.
<b>Petala.</b> (Petals.)	The leaves of the corolla; flower-leaves.	Rose.
<b>Stigmata.</b> (Stigmas.)	The tops of the pistils of flowers, being that part which receives the pollen.	Crocus.
<b>Fructus.</b> (Fruits.)	The matured ovaries of plants, with their contents.	Anise. Juniper. Hips. Colocynth.
<b>Capsulæ.</b> (Capsules.)	Seed vessels which burst open at maturity, allowing the seeds to fall out.	Poppy.
<b>Semina.</b> (Seeds.)	Those parts of the fruit which contain the embryos (or undeveloped plantlets), and by means of which the higher plants are chiefly propagated.	White Mustard. Castor. Nux vomica.
<b>Trichomes.</b> (Hairs.)	Hair-like appendages to the surfaces of plants.	Mucuna.
<b>Glandulæ.</b> (Glands.)	Small cellular organs which secrete oily, aromatic, and other products.	Lupulin.
<b>Pulpæ.</b> (Pulps.)	The soft and parenchymatous parts of vegetables, reduced to a paste by the operation of pulping.	Tamarind Pulp.
<b>Succi.</b> (Juices.)	The fluid obtained by bruising or pressing plants, or parts of plants. Rob, or Roob, is a juice evaporated to the consistency of honey.	Conium Juice.

*Classification of medicinal forms—Continued.*

## I.—CRUDE VEGETABLE DRUGS—Continued.

		Examples.
<b>Gummata.</b> (Gums.)	Solid, uncrystallizable vegetable exudations, insoluble in alcohol, but wholly or partially soluble in water, forming mucilage.	Acacia.
<b>Balsama.</b> (Balsams.)	Natural vegetable products which contain resin, volatile oil, and benzoic or cinnamic acid.	Balsam Copaiba.
<b>Resinæ.</b> (Resins.)	Solid, brittle, inflammable, translucent vegetable products, insoluble in water, but soluble in alcohol, ether, and essential oils.	Rosin, common yellow.
<b>Gummi-resinæ.</b> (Gum resins.)	Compounds of gum, resin, and other vegetable products, exuding from incisions made in certain plants.	Ammoniac.
<b>Feculæ.</b> (Starches.)	Abundant vegetable principles, having the composition $C_6H_{10}O_5$ ; of definite form, tasteless, inodorous, insoluble in cold water, alcohol, and ether.	Wheat Starch.
<b>Sacchara.</b> (Sugars.)	Neutral substances, mostly of vegetable origin, having a sweet taste, soluble in water and dilute alcohol; insoluble in ether.	Cane Sugar.

## II.—CHEMICAL PRODUCTS.

<b>Metals.</b>	Elementary bodies having a metallic luster, good conductors of heat and electricity, and capable of combination with oxygen to form bases.	Iron Filings.
<b>Metallic oxides.</b>	Products of the chemical union of metals with oxygen.	Red Oxide of Mercury.
<b>Metallic salts.</b>	Compounds in which one or more of the equivalents of hydrogen in an acid are replaced by a metal.	Sulphate of Copper.
<b>Mineral acids.</b>	Acids of inorganic origin.	Sulphuric Acid.
<b>Vegetable alkalies.</b>	Substances derived by chemical processes from vegetable products, capable of union with acids to form salts.	Cinchonia.
<b>Vegetable acids.</b>	Acids of vegetable origin.	Tartaric Acid.
<b>Salts of vegetable acids.</b>	Products of the combination of vegetable acids with bases, either organic or inorganic.	Citrate of Iron and Quinine.
<b>Salts of vegetable bases.</b>	Products of the combination of vegetable bases with acids, either mineral or vegetable.	Sulphate of Strychnia.
<b>Neutral organic substances.</b>	Substances obtained by chemical processes from vegetable or animal products, not forming salts with acids or bases.	Digitalin.

*Classification of medicinal forms—Continued.*

## III.—PHARMACEUTICAL PREPARATIONS.

A.—*Solids.*

		Examples.
<b>Species.</b> (Species.)	Mixtures of several plants or parts of plants, dried and cut into small fragments. Used for making decoctions, infusions, etc.	Species Pectorales (Ph. G.)
<b>Pulveres.</b> (Powders.)	Substances reduced into small particles by trituration, precipitation, granulation, or sublimation.	Powder of Ipecac.
<b>Pilulæ.</b> (Pills.)	Small globular masses of a size that may be swallowed without mastication.	Not coated. Sugar coated. Gelatine coated. Silver-leaf coated. Gold-leaf coated. Compressed. Printed. Granules. Boluses, etc. Capsules: Gelatine. Pearls. Folding, etc.
<b>Extracta.</b> (Extracts.)	Solid preparations resulting from the evaporation of solutions of vegetable principles.	Extract of Gentian.
<b>Resinæ.</b> (Resins.)	Medicines prepared by exhausting the substances from which they are obtained by alcohol, and precipitating the resinous matter with water.	Resin of Jalap.
<b>Confectiones.</b> (Confections.)	Soft solid medicines, in which the medicinal substances are incorporated with sugar or honey. The term includes Electuaries and Conserves.	
<b>Electuariæ.</b> (Electuaries.)	Medicinal substances, generally in the form of dry powders, combined with sirup or honey.	Confection of Senna. (U. S. Ph.)
<b>Conservæ.</b> (Conserves.)	Consist of recent vegetable substances and refined sugar beaten into a uniform mass.	Confection of Rose. (Br. Ph.)
<b>Chocolatæ.</b> (Chocolates.)	Medicines of which the vehicle is a mixture of chocolate and sugar.	Chocolat Ferrugineux. (Codex.)
<b>Pastæ.</b> (Pastes.)	Compounds of medicinal substances with sugar and gum. Their soft solid consistence distinguishes them from troches.	Marshmallow paste.
<b>Saccharureta.</b> (Saccharures.)	Medicines in the form of powder, composed of sugar mixed with medicinal substances.	Saccharure de Lichen. (Codex.)
<b>Oleosaccharureta.</b> (Oleosaccharures.)	Medicines composed of essential oil and sugar.	Oleosaccharure d'anis. (Codex.)

*Classification of medicinal forms—Continued.*

## III.—PHARMACEUTICAL PREPARATIONS—Continued.

## A.—Solids—Continued.

		Examples.
<b>Trochisci.</b> (Lozenges; Troches; Tablettes, Codex.)	Compounds of sugar with medicinal substances, made into paste with mucilage, cut into various shapes and dried.	Troches of Potassium Chlorate.
<b>Rotulæ.</b> (Sugardrops; Pastilles, Codex.)	Compounds of medicinal substances with sugar, differing from troches in being prepared with the aid of heat.	Peppermint Drops.
<b>Gelatinæ.</b> (Jollies.)	Soft solid compounds of medicinal substances, with gelatinous or gummy matters, having the well-known trembling consistence of jelly.	Gelée de Carrageen. (Codex.)
<b>Sapones.</b> (Soaps.)	Products obtained by treating fatty bodies, with alkalies dissolved in water.	White Castile Soap.
<b>Unguenta.</b> (Ointments.)	Topical applications of such consistence that they may be easily rubbed on the skin, becoming gradually liquefied.	Ointment of Rose-water.
<b>Cerata.</b> (Cerates.)	Unctuous preparations of such consistence that they may be spread at ordinary temperatures, but do not melt when applied to the skin.	Goulard's Cerate.
<b>Emplastra.</b> (Plasters.)	Solid preparations which are spread by heat, and which are adhesive at the temperature of the body.	Lead Plaster.
<b>Sparadrapa.</b> (Sparadraps.)	Plasters spread upon leather, linen, muslin, or silk.	Adhesive Plaster on cloth. Adhesive Plaster on leather. Isinglass Plaster. Court Plaster.
<b>Chartæ.</b> (Med. papers.)	Paper impregnated with medicinal substances or upon which preparations resembling plasters have been spread.	Cantharides Paper.
<b>Suppositoria.</b> (Suppositories.)	Solid medicinal preparations intended to be introduced into the rectum or vagina.	Suppositories of Tannin.
<b>Cataplasmata.</b> (Cataplasms; Poultices.)	Topical applications of the consistence of soft paste, composed of powders mixed with water, various solutions or fixed oils.	
<b>Cigarettes.</b>	Dried medicinal plants cut fine and rolled in papers for smoking.	Cigarettes of Stramonium. (Codex.)
<b>Pastilli.</b> (Pastilles.)	Compounds of aromatic substances used in fumigation.	Fumigating Pastilles.



*Classification of medicinal forms—Continued.*

## III.—PHARMACEUTICAL PREPARATIONS—Continued.

B.—*Liquids.*

		Examples.
<b>Decocta.</b> (Decoctions.)	Solutions of vegetable principles obtained by boiling in water.	Decoction of Senega.
<b>Infusa.</b> (Infusions.)	Solutions of vegetable principles, made with hot or cold water <i>without boiling</i> .	Infusion of Wild Cherry.
<b>Ptisanæ.</b> (Tisanes.)	Very dilute infusions intended for use as habitual drinks by the sick.	Tisane de Gentiane. (Codex.)
<b>Liquores.</b> (Solutions.)	Aqueous solutions in which the substance acted upon is wholly soluble in water.	Solution of the Arsenite of Potassium.
<b>Aquæ medicatæ.</b> (Medicated waters.)	Aqueous solutions of volatile oils or gases.	Cinnamon Water.
<b>Mucilagines.</b> (Mucilages.)	Aqueous solutions of gum or allied substances.	Mucilage of Sassafras Pith.
<b>Misturæ.</b> (Mixtures.)	Preparations containing medicinal substances <i>in suspension</i> in watery fluids. In a more general sense, liquid preparations composed of several ingredients, and not otherwise classified.	Compound Mixture of Iron.
<b>Emulsiones.</b> (Emulsions.)	Mixtures in which the suspended substance is of an oleaginous or resinous nature, suspension being aided by gum or yolk of egg.	Ammoniac Mixture.
<b>Linctus.</b> (Linctures.)	Medicines of sirupy consistence, formerly sucked from end of a liquorice stick.	Looch Blanc. (Codex.)
<b>Syrupi.</b> (Syrups.)	Concentrated solutions of sugar in watery fluids, either with or without medicinal impregnation.	Syrup of Rhubarb.
<b>Mellita.</b> (Honeycs.)	Preparations in which honey is used as the vehicle of the medicinal substance.	Honey of Rose.
<b>Oxymellita.</b> (Oxymels.)	Medicated honeys containing acetic acid.	Oxymel of Squill.
<b>Aceta.</b> (Vinegars.)	Includes distilled vinegar and infusions and solutions of medicinal substances in vinegar or acetic acid.	Vinegar of Lobelia.
<b>Tincturæ.</b> (Tinctures.)	Solutions of medicinal substances in alcohol, prepared by maceration, digestion, or percolation. <i>Elixirs</i> are compound tinctures, generally highly flavored and sweetened.	Tincture of Guaiac.
<b>Alcoolaturæ.</b> (Alcoolatures.) (Codex.)	Tinctures prepared with fresh plants.	Tincture of Fresh Orange Peel. (Br. Ph.)
<b>Tincturæ æthereæ.</b> (Ethereal tinctures.)	Liquid preparations in which the menstruum is a mixture of alcohol and ether.	Ethereal Tincture of Lobelia.

*Classification of medicinal forms—Continued.*

## III.—PHARMACEUTICAL PREPARATIONS—Continued.

B.—*Liquids*—Continued.

		Examples.
<b>Vina.</b> (Wines.)	Preparations analogous to tinctures in which the menstruum is wine.	Wine of Antimony.
<b>Cerevisiæ.</b> (Beers.)	Medicinal preparations in which beer is the solvent.	Bière antiscorbutique. (Codex.)
<b>Spiritus.</b> (Spirits.)	Alcoholic solutions of volatile principles, prepared by distillation or solution.	Spirits of Lavender.
<b>Ætherea.</b> (Ethers.)	Peculiar, fragrant, sweetish, very volatile inflammable substances, formed by the action of acids on alcohol.	Acetic Ether.
<b>Oleoresinæ.</b> (Oleoresins.)	Extracted from drugs by means of ether. They have the property of retaining their fluidity and composition after the evaporation of the menstruum.	Oleoresin of Cubebs.
<b>Extracta fluida.</b> (Fluid extracts.)	Permanent concentrated solutions of vegetable drugs. Prepared by percolation and concentration.	Fluid Extract of Gentian.
<b>Glycerita.</b> (Glycerites.)	Solutions of medicinal substances in glycerine.	Glycerite of Tannic Acid.
<b>Olea destillata.</b> (Volatile oils.)	Volatile oils obtained from plants by distillation.	Oil of Cloves.
<b>Olea pinguis.</b> (Fixed oils.)	Non-volatile oils obtained from both the animal and vegetable kingdoms. Generally compounds of glycerine, with a peculiar acid.	Castor Oil.
<b>Olea infusa.</b> (Medicated oils.)	Infusions of medicinal substances in fixed oils.	Oleum Hyosciami Infusum (Ph. G.)
<b>Linimenta.</b> (Liniments.)	Liquid or semi-liquid preparations intended for application to the skin by friction.	Soap Liniment.
<b>Enemata.</b> (Enemas.)	Liquid medicines intended for injection into the rectum.	Enema of Opium.
<b>Jusculi.</b> (Broths.)	Decoctions having for their base the flesh of animals, to which medicinal substances may be added.	Chicken.



SMITHSONIAN INSTITUTION.

UNITED STATES NATIONAL MUSEUM.

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No. 8.

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**MEMORANDA FOR COLLECTORS OF DRUGS FOR THE MATERIA  
MEDICA SECTION OF THE NATIONAL MUSEUM.**

**By JAMES M. FLINT, Surgeon U. S. Navy.**

To carry out the plan adopted for the Materia Medica Section of the National Museum, it will be necessary to obtain specimens of all substances used as medicines by the people of all countries. That these specimens may be more than mere museum curiosities, it is important that information be furnished regarding the source and mode of production of each drug. Much doubt still remains as to the exact source of many of the standard articles of the materia medica, and a reinvestigation of any or all of them is to be desired.

The following suggestions are made for those more or less unacquainted with the subject who may have opportunities for making collections, and as aids to memory for the expert:

I. Obtain specimens of all substances used as medicines, and all drugs which are cultivated, or collected for export, in the region visited.

II. Gather as much information as possible concerning each specimen, under the following heads:

If of vegetable origin—

1. Name, commercial, vernacular, and scientific.
2. Botanical and common name of the plant from which the drug is derived.
3. Character of the region in which produced. (Mountain or valley, dry or wet ground, &c.)
4. Mode of cultivation or collection, and preparation for use or the market.
5. Commercial importance (quantity, value, &c.).
6. Supposed medical properties and uses.
7. History of the individual specimen.

It is of the greatest importance to obtain pressed specimens of the flowering plant from which each drug is derived for botanical identification. If a large plant, a single branch, bearing leaves and flowers, may be pressed, or even leaves and flowers separated from the stem. Get seeds also, especially if the flowering plant cannot be had, so that the plant may be propagated in the hot house.

Plants are easily pressed by arranging them while fresh on sheets of absorbent paper, and putting them between boards, under moderately

heavy weights. The papers should be changed every day until the specimens are dry.

If of animal origin—

1. Name of drug.
2. Name and description of animal from which obtained.
3. How obtained and prepared.
4. How used.

If of mineral origin—

1. Name.
2. Source.
3. Composition.
4. Mode of preparation.
5. Medical uses.

III. Bear always in mind that the value of every specimen in each of these divisions will be directly proportionate to the amount of accurate information which accompanies it, especially such as relates to source and mode of production. Everything which will help to illustrate and substantiate this information will be worth diligent search and careful preservation.



SMITHSONIAN INSTITUTION.

UNITED STATES NATIONAL MUSEUM.

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No. 9.

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**CIRCULAR IN REFERENCE TO THE BUILDING-STONE COLLECTION.**

The special investigation of the building-stone industry of the United States made by the Tenth Census is now nearly completed, as far as field work is concerned. It has been a part of the work of this investigation to forward to the National Museum samples of all stones quarried for purposes of construction. These specimens were mostly of such size that they could be dressed into four-inch cubes. Over 3,000 such specimens have been received at the National Museum, and nearly one-half of the number have already been dressed in the following manner: Polished in front; drafted and pointed on the left-hand side; drafted rock face upon the right-hand side; entirely rough behind, and rubbed or chiselled upon the top and bottom. As soon as dressed, the samples are placed in suitable cases, where they may be examined by all who are interested in building stones.

All the building stones of the country are thus brought together for study and comparison. Stones which have not been quarried until recently may be compared with stones of the same kind which have long been in use, and the qualifications of which are well known.

There is also quite a large collection of foreign stones with which comparisons may be made. Nearly every foreign quarry, the product of which is in the markets of this country, is represented by a specimen. There are also quite a number of specimens from foreign quarries, the products of which have been but little or not at all in the markets of the United States.

This collection is now perhaps the largest, most complete, and systematic of any of its kind in the world.

Thin sections for microscopic examination are being prepared from all the different specimens. The purposes of the investigation demand a determination of the compositions and structures of the various rocks, as these in combination with the location and geological features determine the applicability of the stones to various uses, and explain their peculiar properties, and the desired results are most directly obtained by the microscopic examination of thin sections.

This method of study in the hands of the microscopic lithologists has been most fruitful in developing valuable and interesting knowledge of a scientific character. By its means the nature and composition of almost all of the commonly occurring rocks have been determined, and exactly those same features which are of importance in scientific study

are the ones which determine the value and appearance of building stones, and there is no distinction between the scientific and the practical.

The microscopic study of these stones is supplemented by chemical analysis, which is often necessary to determine important points.

In the older and more developed States there are perhaps quarries worked in all the different kinds of rock suitable for building and ornamental stones, and, since the special agents of the Tenth Census, who were engaged on the building-stone investigation, forwarded to the National Museum specimens representing all working quarries, it is probable that the building stones of these States are quite fully represented.

In the newer portions of the country, however, the best buildingstones are not always worked, and since these special agents were instructed to incur no extra expense for collecting information concerning undeveloped material, many of the best stones in these portions of the country are not represented by specimens in the National Museum.

The following table shows the localities from which samples of building stone have been received in those States and Territories in which there are probably other localities which might furnish excellent building stone.

It often happens in a new country that, when a costly building is to be constructed, stone is brought from a great distance at great expense, even if in the immediate vicinity there is an abundance of stone equally good. The home product is not rejected because of prejudice, but because it has not been tried, and because there are no adequate means at hand for examining the material and comparing it with the stones that have been tried.

The collection of specimens of all regularly quarried stones has been most complete and successful. Quite a large number of specimens of stones, but little or not at all quarried, have also been obtained through the special agents of the Census, or through parties interested in the development of the resources of their respective neighborhoods; but there are undoubtedly a very large number of localities which have excellent building stones, and from which no specimens have been sent to the National Museum, and concerning which we possess no information.

That a thorough knowledge of the building stones of any country is of great economic value is unquestionable, and in a rapidly growing country like ours such knowledge is of incalculable value.

It is the purpose of this circular to bring to the attention of those interested in the development of the building-stone resources of their own districts the work that is being done in this connection by the Tenth Census in co-operation with the National Museum, and it is hoped that specimens and information may be received from most, if not all, the localities having valuable undeveloped building stones, in time, that this

information, together with the results of the examination of the specimens may be embodied in the Census Report upon the building-stone industry of the United States.

Any parties who may be interested in furnishing such information, and in forwarding specimens will be furnished with schedules to indicate the nature of the information desired, and with franked labels with which to forward specimens through the mails.

SPENCER F. BAIRD,  
*Secretary Smithsonian Institution,  
 and Director United States National Museum.*

*Statement showing localities from which samples of building stone have been received, in States and Territories from which a more complete collection of specimens of building stones is desired.*

[No specimens have been received from the Indian Territory and Arizona.]

Virginia.	Texas.	Nevada.
North Carolina.	Dakota.	Idaho.
Georgia.	Montana.	Washington Territory.
Florida.	Colorado.	Oregon.
Alabama.	New Mexico.	Wyoming.
Kentucky.	Utah.	California.
Arkansas.		

*Localities from which specimens of building stone have been received at the National Museum.*

VIRGINIA

No.	Name of stone.	Town.	County.	Quarry.
2	Granite .....	Near Fredericksburg .....	Spottsylvania..	E. J. Leyburn.
2	do .....	Tuckahoe district .....	Henrico .....	J. B. Mitchell & Co.
2	do .....	Near Richmond .....	do .....	Richmond Granite Company.
4	do .....	Manchester .....	Chesterfield...	Westham Granite Company.
2	do .....	Granite .....	do .....	Old Dominion Granite Co.
2	Slate .....	Near New Canton .....	Buckingham ..	Edwards & Roberts.
1	Limestone ..	Near Staunton .....	Augusta .....	Red Bud Slate Company.
2	Slate .....	Near New Canton .....	Buckingham ..	J. R. Williams & Co.
2	Granite .....	Namozie district .....	Dinwiddie .....	D. W. Lassiter, Smith & Southall lessees.
2	do .....	do .....	do .....	Mayfield Quarry, Gill & Hubbard lessees.
2	Gneiss .....	Lynchburg .....	Campbell .....	Fishing Creek Quarry, owned by S. Patterson & Son.
1	Soapstone....	Chula Station .....	Amelia .....	Old Dominion Stereotype Company.
2	Mica schist...	Near Chain Bridge .....	Fauquier .....	Gilbert's.
2	Diabase .....	Near Catlett's Station .....	do .....	Fauquier Quarry, Charles Andrews proprietor.
1	Soapstone....	Vallena .....	Buckingham ..	George Chambers.
4	Marble .....	Craigsville .....	Augusta .....	Coral Marble Company.
2	do .....	do .....	do .....	Craig's.
2	Diabase .....	Near Leesburg .....	Loudoun .....	East Bend Quarry, T. W. Edwards owner.
1	Marble .....	Near Greenwich .....	Rockbridge .....	From Daniel Fagan.
2	Limestone ..	Near the line of the Richmond and Allegheny Railroad.	do .....	Joseph G. Steele.

*Localities from which specimens of building stones have been received, &c.—Continued.*

NORTH CAROLINA.

No.	Name of stone.	Town.	County.	Quarry.
3	Leopardite....	Near Charlotte.....	Mecklenburgh..	W. Y. Yates.
1	Soapstone ....	Nantahalal .....	Swain.....	Quarry on Nantahalal River.

GEORGIA.

2	Gneiss .....	Atlanta .....	Fulton .....	Patriek Lynch.
2	Granite .....	Stone Mountain Station, Atlanta (Ga.) Railroad.	De Kalb .....	Callahan & Welch.
2	Limestone ....	12 miles from Chattanooga, on W. & R. Railroad.	Catoosa .....	Chickamauga Quarry.
1	Pagodite .....	9 miles from Washington .....	Wilkes .....	From Charles W. Shepard.

FLORIDA.

5	Sandstone ....	Hawthorn .....	Alachua .....	C. A. Simmons.
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ALABAMA.

2	Limestone ....	Near Dickson.....	Colbert .....	F. L. Fossick & Co.
1	Sandstone ....	Alabama & Gt. Southern R. R.	DeKalb.....	Collinsville Quarry.

KENTUCKY.

2	Limestone ....	Bowling Green .....	Warren.....	Belknap, Dumisneil & Co.
2	...do .....	Louisville .....	Jefferson .....	City Quarry.

ARKANSAS.

2	Sandstone ....	Bald Knob.....	White .....	Bald Knob Quarry.
1	Limestone .....	.....	Marion .....	Quarry not stated (small).
1	...do .....	Blansett .....	* Benton .....	From railroad cut.

\*This is probably Scott County.

TEXAS.

1	Limestone ....	Near Austin .....	Travis.....	Judgo Joseph Lee.
2	...do .....	...do .....	...do .....	Banquas Quarry.
2	...do .....	8 miles north of Austin .....	...do .....	Quarry not opened.
2	...do .....	9 miles from Austin (Duval Station).	...do .....	Do.
2	...do .....	Above Austin .....	...do .....	Quarry not stated.
2	Sandstone ....	9 miles southwest of Burnet ..	Burnet.....	Do.
2	...do .....	2 miles east of Burnet .....	...do .....	Do.
2	Limestone ....	5 miles southwest of Burnet ..	...do .....	Stony Creek.
2	...do .....	3 miles south of Burnet .....	...do .....	Not stated.
2	Granite .....	15 miles from Burnet .....	...do .....	Backbone Valley.
1	...do .....	15 miles from Burnet .....	...do .....	Quarry not stated.
2	Limestone ....	10 miles above Austin .....	Travis.....	Quarry on Bull Creek.
2	Sandstone ....	8 miles south of Burnet .....	Burnet.....	Quarry not stated.
2	...do .....	Riverside .....	Walker .....	Do.
2	Limestone ....	3 miles south of San Saba .....	San Saba.....	Dr. Gregg's quarry.
2	Dolomite .....	2 miles southwest of Burnet ..	Burnet.....	Not stated.
2	Sandstone ....	Orange (station on Texas Pacific Railroad).	Eastland.....	Quarry of J. G. Searcey and R. B. Hubbard.
1	Limestone .....	4 miles south of San Saba .....	San Saba.....	Dr. A. Gregg's quarry.
1	...do .....	3 miles south of San Saba .....	...do .....	Do.
1	...do .....	3½ miles from San Saba .....	...do .....	Do.
1	...do .....	San Saba .....	...do .....	Do.
1	...do .....	10 miles south of San Saba .....	...do .....	Do.
1	...do .....	San Saba .....	...do .....	Do.

*Localities from which specimens of building stone have been received, &c.—Continued.*

## DAKOTA.

No.	Name of stone.	Town.	County.	Quarry.
4	Quartzite.....	Sioux Falls .....	Minnehaha .....	Phillips Quarry.

## MONTANA.

3	Rhodochrosite	Walkersville .....	Deer Lodge.....	Quarry of Alice Gold and Silver Mining Company, Wm. E. Hall superintendent.
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## COLORADO.

2	Sandstone ....	Fort Collins .....	Larimer .....	Fort Collins Quarry.
2	Granite.....	Platte Cañon .....	Jefferson and Douglas.	Quarry of the government.
2	Sandstone ....	Near Cañon City.....	Fremont.....	Berlin Quarry.
2	Rhyolite.....	Castle Rock .....	Douglas .....	Girardair's Quarry.
2	Sandstone ....	Fort Collins .....	Larimer .....	Fort Collins Sandstone Quarry
2	do .....	Trinidad.....	Las Animas .....	Trinidad Quarry.
2	do .....	Coal Creek .....	Fremont.....	Coal Creek Quarry.
2	do .....	Arkansas River .....	do .....	Brandford Quarry.
2	Sandstone, red and white.	Sections 3 and 4, range 70 west	Jefferson .....	Welch Quarry.
1	Granite.....	Sections 19 and 20, township 3 south, range 70 west.	do .....	Pulcher's Gulch.

## NEW MEXICO.

3	Sandstone ....	Near Santa Fé .....	Santa Fé.....	Santa Fé Quarry.
1	Rhyolite.....	Cienago, 15 miles southwest of Mesa, Santa Fé.	do .....	Quarry not stated.
1	Pumice-stone .	3 miles south of Santa Fé .....	do .....	Do.

All collected by Major Stevenson.

## UTAH.

4	Marble .....	Paysons, 70 miles south of Salt Lake City.	.....	Quarry not stated.
4	Sandstone ..	Red But, 2½ miles east of Salt Lake City.	.....	Do.
1	Limestone ....	Paysons, 70 miles south of Salt Lake City.	.....	Do.
2	do .....	San Peter Valley .....	.....	Do.
2	Granite .....	Little Cotton Cañon .....	Near Salt Lake City.	Do.

## NEVADA.

4	Trachyte .....	3 miles east of Virginia City..	Storey .....	John Barrett's.
2	Andesite.....	2 miles west of Reno .....	Washoe.....	Fulton's Quarry.
2	Sandstone ....	Carson City .....	Ormsby .....	Carson Quarry.

## IDAHO.

2	Sandstone ....	Boisé City .....	Ada .....	From William Thews.
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*Localities from which specimens of building stone have been received, &c.—Continued.*

WASHINGTON TERRITORY.

No.	Name of stone.	Town.	County.	Quarry.
2	Sandstone . . .	Chuckanut Bay. . . . .	Whatcom. . . . .	C. Seidel & Co.

OREGON.

4	Sandstone . . .	Near Oakland . . . . .	Douglas . . . . .	W. H. Leeper.
2	do . . . . .	do . . . . .	Clackamas. . . . .	Clackamas River Quarry, owned by W. Young.

WYOMING.

2	Granite. . . . .	Dale Creek . . . . .	do . . . . .	Quarry of G. Griffith.
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CALIFORNIA.

2	Sandstone . . .	Haywards . . . . .	Alameda. . . . .	Excelsior Quarry.
2	Tuff . . . . .	Near Cordelia . . . . .	Solano . . . . .	Thomason Quarry.
6	Sandstone . . .	Eight miles south of San José.	Santa Clara. . . . .	Goodrich Quarry.
2	Limestone . . .	Tehichipa . . . . .	Kern . . . . .	Small pieces; quarry not stated.
2	Sandstone . . .	Livermore . . . . .	Alameda. . . . .	Livermore Quarry.
2	Basalt . . . . .	Petaluma . . . . .	Sonoma . . . . .	Petaluma Quarry.
2	do . . . . .	Bridgeport . . . . .	Solano . . . . .	Thomason's Quarry.
1	Limestone . . .	Suisun City . . . . .	do . . . . .	Suisun Quarry.
2	do . . . . .	Colfax . . . . .	Placer . . . . .	Colfax Quarry.
2	Marble . . . . .	Twenty miles south of San Luis Obispo.	San Luis Obispo	San Luis Obispo Quarry.
2	Sandstone . . .	Angel Island. . . . .	Marin . . . . .	Angel Island Quarry.
2	do . . . . .	In range east of Alameda.	Alameda. . . . .	Quarry not stated.
4	Granite . . . . .	Near Penryn . . . . .	Placer . . . . .	G. Griffith.
2	do . . . . .	Near Rocklin . . . . .	do . . . . .	Do.
3	Marble, yellow	Town not stated. . . . .	Kern . . . . .	Mr. Luce (small).
2	do . . . . .	Indian Diggings. . . . .	El Dorado . . . . .	Quarry not stated.

SMITHSONIAN INSTITUTION.

UNITED STATES NATIONAL MUSEUM.

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No. 10.

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**TWO LETTERS ON THE WORK OF THE NATIONAL MUSEUM.**

**By BARNET PHILLIPS.**

[Reprinted, by permission, from the New York Times.]

WASHINGTON, *February 3, 1882.*

As early as 1846, with the establishing of the Smithsonian Institution, Congress placed under its charge all objects of natural history, mineralogy, geology, and antiquities belonging to the United States. At that time, some thirty-six years ago, such collections as belonged to the country consisted almost entirely of objects gathered during the Wilkes explorations. While the Smithsonian Institution was in the act of crystallization, before it had taken definite shape, the Commissioner of Patents took care of such objects. When, in 1856, the central portion of the Smithsonian building was erected, the Wilkes collection and some few other objects were placed in its charge. The Wilkes collection may, however, be considered as having been that nucleus around which other objects belonging to the United States have been grouped when in their preservation the idea was sustained of presenting them for educational purposes. But with the increase of such collections which accompanied that great desire for information which has been one of the marked characteristics of a period included within the last twenty years, this augmentation has been marvelous. Those results of explorations, which the best brains in the country may have condensed in a page or a volume, have only been studied by means of tangible things, collected over vast areas, and finally brought to Washington. But more than this. In the industrial exhibitions in which this country has taken part, on some special occasions the government has been to large expense in the collecting of objects, as such exhibits were the very best representative ones of the day. These have been too valuable to be lost sight of, and have been preserved in their unity. At the same time, the United States has had presented to it a great accumulation of objects, both natural and manufactured, and among these gifts at the close of the Centennial Exhibition not less than twenty-five countries contributed their quota.

What to do with all this material became an important question. To hide all this light under a bushel would be to deprive the country of a fund of information obtainable nowhere else. The question of room space to exhibit them was a secondary one to that method, a philosophical one, which should govern the classification of such a museum. Immediately after the Centennial, when the public mind became more

familiar with the great advantages derivable from a collective exhibition, the work of building up a national museum was actively taken up by Prof. Spencer F. Baird, at that time assistant-secretary of the Smithsonian Institution, by whose tireless energy the great natural history collections of the Institution had already been accumulated. There was an abundance of material already on hand, an accumulation of riches, but what was wanting was room to put it in.

Now, museums to-day differ in conception as much as does the writing of history from the plans in vogue fifty years ago. If Macaulay was among the first to draw the history of a people, with but slight allusions to kings and queens, and Green compiled the story of England, giving sovereigns but a passing notice, museums to-day, though they include in them such objects as are rare and precious which may have decked kings and queens, no longer seek for such matter exclusively. They no longer care for an audience which will simply gape and stare. It has grown as rapidly in the minds of those who establish museums and those who visit them that, although the pleasure to be derived from seeing a beautiful or a rare object is not to be made light of, the emotional instinct is not alone to be awakened. Imitative or inventive faculties must be stimulated. It is the fostering of one element, the practical one, that of positive object teaching, which all museums must strive for. The heaven must work in the most sluggish mind, and the instruction of the masses must be constantly undertaken. The South Kensington Museum has its highly æsthetic side, but it must be at one and the same time not only the school of the artist but of the artisan.

The National Museum in Washington, known perhaps for the first time as the locality where the late President's inauguration ball took place, is now open to the public. In its conception may be found one of the grandest of all schemes for instruction. Such a plan may be comprehended in a certain way when it is stated that it takes man for its central pivot, and around this is to revolve everything that man has done in the past or in the present in the world he lives in. Those depths which he has plumbed in the seas will contribute their quota, and where he has sought for light in the realms of heavenly space such slight information as he has gleaned will all be presented here. Not a science is there which man has studied which will not find its representative objects. This museum, besides, is to enter into every detail of human life, not only of the present but of the past, and is to be the custodian of its future. Its mission is to keep going on collecting for ever and ever. It will show to our great-great-grandchildren how their forefathers dressed, how they lived, cooked and ate their food, how they amused themselves, and 1992 will learn of the toys the children of 1882 played with. There is nothing, ever so trivial, which is thought unworthy of notice. The study of the evolution of anything is supposed to impart its lesson, and the spinning-wheel of a past time is to lead up by many stages to the more perfected mechanisms of to-day. Such a grand work as is prospected will, of course, take years to perfect. The

originators of such a comprehensive scheme are perfectly conscious how short is life, and they know that the conclusion of their work is as far off as is eternity. Yet, for this task there are many men who are ready to labor on for years, conscious of the enormous advantages such a museum will present—not only in the next decade, but in the future. They are sanguine that in a comparatively short period this National Museum can be made attractive, and that the interest in it will increase in exact proportion with the instruction it imparts.

In describing the sources from whence already a large proportion of the collection has been derived, that coming in now from the census plays an important part. This census in some of its labors gave for results more than a dry catalogue, to be summed up by a row of figures. Tangible evidences of the resources of the country were required, and in some instances crude or manufactured objects were obtained. The mineral wealth of this country has been better understood by the last census than ever before. Thousands on thousands of specimens of building stone, collected all over the United States by the Census Bureau, are now deposited in this museum. Now, if these stones be followed out even briefly, they will explain the rationale, the thorough character, of an exhibition of this kind, which precise method is to be applied to every other substance.

Fragments of each stone lie alongside of the square block, the sides of which has been polished in various styles. A visitor at once sees how the stone works. If he is a builder of houses, a contractor who undertakes work to cost a million, or his workman, a certain quota of positive information is received. He who pays his money or is to receive it—both are taught. But this lot of stone is just on the commencement of its investigations. Fragments of it have been subjected to chemical analysis, and its exact chemical constituents are learned. The geologist has studied it. Then the microscopist has put it under his lens and has found out its structure. Finally, it has been subjected to the mechanician, who tried its strength and learned how much strain it would stand. Now we begin to appreciate how thorough and exhaustive is the method to which this specimen has been subjected. The visitor knows from the label, if he can read, locality, composition, and absolute value.

Simply looking at these objects to be exposed only as things, irrespective of natural characteristics, the process of study is to be the same throughout. Here are endless bottles of pharmaceutical preparations. Every one of these is being subjected to analysis. Each one will tell its own story, as where found, method of preparation, where derived, consumption, and, what is more, the cost will be indicated.

Now, it often happens that, in the multifarious business of the government, exact information is required in regard to substances on which duties are to be levied. It has heretofore been the habit to subject these substances to special experts. To-day, for already the working



departments of the museum are in full blast, all these analyses can be, and are, actually being carried on.

As to that method of instruction, which must, however, be paramount to everything else, many new methods will be observed. If a certain product is to be exhibited as complete in itself, a requisite of such an exhibit will be that all the stages of such a manufactured article will be shown. Every step which can illustrate the perfected progress will be forthcoming. In the same case will be shown the very books which contain information on this particular substance, or, if not the books themselves, references to the volume and the page. A series, then, of labels, exhaustive in character, are to accompany all objects.

Materials as they are gathered serve at the same time as a basis for scientific research. It is not only for those who are satisfied with the commercial aspect of things in general that the museum serves a great purpose, but its collections react on the man of pure science. It is, then, in addition to being a museum of deposit or record, one of most active research. It can never be languid or wanting in interest, for the elements of life must exist from both without and within.

With such a scheme comes in the practical working of it. How, having to-day such a vast assemblage of objects, with an avalanche coming, how shall all these be exposed so "as to enable visitors to make their examinations with the least possible fatigue of eye and limb? How are objects to be labeled in the most concise and instructive way, so as to make the museum, as a whole, as beautiful and attractive as possible?"

Prof. G. Brown Goode, under whose care the practical work of the museum is being carried out, and who has given a great deal of attention to the classification, writes as follows: "The new building more than meets expectation. The illumination is perfect, the amount of space available for exhibition purposes is undoubtedly the maximum for a building of the size, and the disposition of the exhibition hall on a single level, directly upon the surface of the earth, proves to be of great importance to visitors and to those who have in hand the work of arranging the collections."

None but those thoroughly acquainted with the exigencies of a collection can appreciate the amount of thought necessary to construct such an apparently simple thing as a case. If it is to be substantial it must not be too bulky or overornamented, as one does not visit a museum to admire cabinet-work, but the objects it contains. It must be so arranged as to take in all the light. It must be quite air-tight, so as not to admit dust or moisture. With such a vast hall as that of the National Museum, where there are no partitions, the roof being held by square supports, the cases will mark the divisions. These cases must be so arranged as to be movable. In size they should bear a definite proportion to that of the hall. As there are to be lecture spaces left in the museum, these cases must be so built as to be readily transportable or interchangeable. In this way a lecturer may treat a sub-



ject, and at an hour's notice have himself surrounded by all the objects he may require for the demonstration of his lesson.

In the analysis of the plan of classification, the importance of which should never be forgotten, commencing with man, he is considered (1) as a zoological unit or species, (2) as grouped in tribes and races, (3) as an individual, as a representative man; and (4) in his vocations. Suppose, in his vocations, we take what are called the exploitative industries. The primary would be quarrying, mining, the ice industry, engineering, collection of field and fruit products, lumbering, hunting, fishing, and the butchers' industry. Now, in the secondary branches of vocations more complex would be agriculture, horticulture, forestry, landscape gardening, pecudiculture, domesticated animals, and acclimation. When we come to what are designated as elaborative industries and the arts, the list is very great. In studying the social relations of man enters telegraphy, government, laws, punishments, and with it war, with all the implements, offensive and defensive. With the intellectual and moral conditions of man come his superstitions, his crimes, errors, religious organizations and systems, his benevolent enterprises, charities, reformatory institutions, his amusements and sports, pictorial and plastic art, music, the drama, folk-lore, proverbs, traditions, literature, and science.

Endeavoring to show the enormity of this work only by its subdivisions, as illustrative of man's amusements, there are his toys and play-things. A philosophical analysis takes place. There are toys which attract one's senses—that of the eye, others the ear. A toy may combine both. Then there are mimetic toys, as dolls, miniatures of implements or useful objects. Now, fancy a series of toys extending back a century, or a row of cases filled with the dolls of both hemispheres. Smile as one may, still, to those who will study such things, wonderful are the lessons to be learned. Questions of kindred habit are often to be found in these minor topics, which tell the story of a race.

What a wonderful collection that would be illustrative of the drama, and how amazing would be the splendor of it. Think of the blaze of costumes and the leer of innumerable masks, for it would have to start, as a foundation, with the copies of those masks the Greeks used when *Œdipus Tyrannus* strode the stage. It has been said that nothing is to escape this vast collecting vortex. Here *in situ*, just as one enters the museum, is a case filled with Japanese masks, such as are used by Japanese actors for a religious drama of the fourteenth century. Away up stairs in one of the side storage-rooms littering the floor are a number of wooden masks yet unclassified. These come from the northwest coast of America. The veriest smatterer in archaeological matters can at once see how striking is the resemblance between the contour and the grimace of the Japanese masks and those of the American Indian. The parallelism is complete. Are we to determine, then, at once from these indications that these two races are of one common origin? Was

America peopled from the east, or was Asia made populous from the west? Such a deduction from one single class of objects would be a most unsafe conclusion; but when in such a museum, at some future date, a great stock of material will be furnished, and a series of things brought in close juxtaposition, when the labors of thousands of collectors are fused, as it were, into one whole, then the anthropologist, ethnologist, and archaeologist can apply their individual tests conjointly or separately, and much of the turbidity which exists to-day will be fined out, and a clearer and more limpid solution must come from it.

The building is a square one, with sides of 327 feet. It is surmounted by a cross and dome. Within there is a net area of 102,200 square feet, or 2.35 acres, the whole building being under one roof. On the main floor there are 17 halls, which communicate with wide and lofty archways, and there are 80,300 square feet of floor space. No less than 135 rooms are available for administrative functions, such as offices, &c. At present occupying these offices are those engaged in work on the geological survey, materia medica, analysis of foods, mineralogy, economic geology, entomology, chemistry, mammalogy, paleontology, herpetology, and photography. There are many more offices not yet occupied, but which will soon be filled with workers. The material is so vast that the task of studying it will never cease.

Taking up once more the considerations which have induced the government to undertake so great a task, those who have been its scientific advisers have fully brought to its notice the vast accumulation of material existing in Washington and throughout the country, and how, hidden away as it was, aside from the question of loss or dispersion, in its present condition it was utterly unavailable. When once such a work was undertaken, the exhibition of all the government collections, those which must necessarily be made in the future, it was shown, would find in this museum their natural resting place. It is by the power of generalization necessarily cosmical in its character that the great advance this nation is making will be then recorded. It is in a national museum that all specialists will come to study, and, as the attraction of the greater mass will be irresistible, this museum must in time absorb many lesser ones. Either by purchase or bequest, before long, minor collections will come to it, of all possible kinds, just as happens to-day to the British Museum.

It may take some years before some of those special branches of human work such as France, England, Germany, Spain, Russia, or Italy glories in will find their way to our National Museum, but it is simply a question of time. Save in this respect, it seems that in ten years this museum will have no rival. Its present is assured. For its future its plans are so intelligently conceived that it must increase in proportion with the growth of the country. Always remembering that there is no scientific fact discoverable, no matter how abstruse it seems, or to what field of study it belongs, which does not directly tend toward man's welfare,

the vast practical benefits to be derived from this museum of research will be at once appreciated by our people. It is to be the living, tangible encyclopedia of all things and the great public instructor. Its purpose is to shape men's minds for vast projects and to keep pace with the rapid strides we are making. Washington may be a half a day's journey from the largest center in the United States, but in a few years students from all this continent will come to it to work out their tasks in the National Museum.

B. P.

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WASHINGTON, *February 15, 1882.*

Such interest as may have been awakened by the announcement that the country had established a great National Museum, which was now open to the public, was naturally accompanied by some curiosity as to the manner in which such a huge building shall be filled. It has been already stated that the government possesses a vast amount of superb material. There is not a special department in Washington which does not have hidden away collections which, though of great value, have never yet seen the light. Every year the museums abroad send over to this country photographic copies of what is finest in their collections, and, unfortunately, such excellent material has never been available because, before this, there never has been any way of showing it. Take, for instance, a case just now at point, those wonderful discoveries lately made at Thebes. Undoubtedly, before long, accurate pictures of these mummies, their coffins, the various objects surrounding them, will be made by the Egyptian Government, and will be distributed. Should any such come to us, at once they will find a place awaiting them in this museum. If only the desire was evinced by our government to have copies of the best antiques taken from the Louvre, the British, or the Berlin Museum, such plasters would be sent to us. An interchange of gifts between two governments is but an act of simple courtesy.

If we cannot exchange in return art subjects, at least we possess an endless number of objects which any museum in Europe would be glad to have. A duplicate of some antediluvian form which paleontologists like a Leidy, a Cope, or a Marsh had found and studied, is the equivalent in value of a cast of even the gods struggling with the giants. This possession of duplicates on the part of the museum will always be the means of increasing the collection with the choicest of foreign objects. But all these, the factors of a collective power, will be secondary to the action of the government itself. We have commercial agents all over the world, and, familiar as they must be with the countries they live in, if the objects of such a museum as the one at Washington were fully understood by those powers with whom our consuls are in relationship, products both of an industrial and artistic character could be turned into our museum. For many a year to come industrial exhibitions will



be held not only at home, but abroad, and at the conclusion of such exhibitions there is always a large number of objects which could be collected without cost.

It should be remembered that the British Museum, magnificent as it is to-day, is not of so very old a date, and that the choicest portions of its collections have been presented to it. In the United States the era of collecting has only commenced. Thirty or forty years ago there was not enough wealth or leisure to permit of it. Men who for the sheer love of a thing devote a great deal of money and many years of their lives to the gathering together of the specimens belonging to a subject they have studied, are loth to lose even by death such associations as may have coupled their names with their collections. If such men know that the United States possessed a safe storehouse, where their collections would be forever preserved, this National Museum will in time fall heir to a great many objects of intrinsic value.

Our National Museum, as has been stated before, has but one object in view, and that is of an educational character, and it insists that there is nothing in this world which cannot instruct man, from a spade to a Greek bronze. It intends to undertake object lesson in its most extended manner. It offers no restrictions as to entrance. It even proposes, should ever the want become manifest, to open its vast arcades at night and to illuminate all its cases. Such vast conceptions as this museum entertains are not in the least impossible. They are not a step in advance of the times we live in, but are rather the corollary of our progress.

In describing as far as construction goes the physical characteristics of this museum, its spacious halls, its innumerable cases, its many workshops, these details are really secondary to that intangible thing the spirit which is to guide this institution, not only for to-day, but forever. It is, in a certain measure, an offshoot of the Smithsonian, though distinct from it. That small fund which a generous Englishman gave us a half-century ago has, under the management of the late Prof. Henry and the present Secretary, Prof. Spencer F. Baird, resulted in more good than any similar amount of money that ever was left as a bequest.

Commencing in a modest way, the Smithsonian Institution, founded for active research and the distribution of knowledge among mankind, has been forced to become, in a certain way a collector. Its overcrowded rooms to-day show how rapid has been its accumulative power. One of the requisites of research being the ability to make comparisons, it would have been a waste of its powers had the Smithsonian shown any indifference to creating a museum within itself. In studying the earlier legislation directed toward the Smithsonian Institution, in which a variety of plans were proposed, just such a present museum was foreshadowed. But, most fortunately, there were wise heads at work when the Smithsonian was in its infancy. Such a load as that of a museum would have swamped it in its earlier days. The public men of fifty years ago foresaw that with time a vast museum might be developed; they were too intelligent to expect it to be forthcoming at once.

It does not, of course, behoove a great national enterprise of the character I have tried to describe to play the part of a solicitor, nor can it go from collector to collector and beg for contributions for its cases. Still, without directly asking such an enlightened mass of people as our own, it counts a great deal on private support. It believes that there are many people in this country—men of means, of intelligence—who, if they understood what is the aim of this museum—that of national education—they would gladly send to it their collections, or, knowing what particular class of objects the institution was desirous of securing, would come forward spontaneously and give it their aid.

That this is absolutely the case, and that such praiseworthy generosity does exist, I can myself testify to. Already some of the leading manufacturers of the country are sending forward collections of the objects they produce. The museum authorities exercise a choice in their selection, and deprecate anything that might assimilate the museum to an industrial exhibition, or, in other words, that one class of objects should be received in competition with another. What is to be taken by the museum is to be the best, and only one particular class of objects illustrative of a class of industry is to be accepted.

In the innumerable details necessary to render this museum effective and at the same time uniform, a type of case made under its direction is provided, and all the bottles, &c., or mountings, are provided by the museum. The work of arrangement and classification is already going on with great rapidity, and the publicity given to the museum is already bringing many visitors to it. Before long, in a series of cases will be arranged the musical instruments, the United States having fallen heir to a very curious collection coming from the East. The labor which is entailed on the officers of the museum is very heavy. Just as rapidly as possible new centers illustrating a particular subject are made, and with one case filled, others group themselves around it. The curators are amazed at the riches which have been stowed away in the vaults and lumber-rooms of the various departments in Washington, and there is every reason to suppose that when, in time, they can push their explorations other mines of wealth will be discovered. Many of these things have existed for the last twenty years, nailed up in boxes or tied up in portfolios, and not a human soul has been the wiser for them.

I have been obliged to repeat how immense is this plan, how wide is the ground it covers, how different are the subjects it includes, and, in order to make myself better understood, I give the list of the officers of the National Museum, with the various departments under their charge:

Spencer F. Baird, Secretary of the Smithsonian Institution, Director of the Museum; G. Brown Goode, Assistant Director, Curator, Department of Arts and Industries; Tarleton H. Bean, Curator, Department of Fishes; William H. Dall, Honorary Curator, Department of Mollusks; Frederick P. Dewey, Assistant, Department of Minerals and Economic Geology; James M. Flint, Honorary Curator, Section of Ma-



teria Medica; J. Howard Gore, Honorary Curator, Section of Foods; George W. Hawes, Curator, Department of Minerals and Economic Geology; Richard Rathbun, Curator, Department of Marine Invertebrates; Charles Rau, Curator, Department of Antiquities; Robert Ridgway, Curator, Department of Birds; Charles V. Riley, Honorary Curator, Department of Insects; R. W. Shufeldt, Honorary Curator, Section of Bird Skeletons; Robert E. C. Stearns, Assistant, Department of Mollusks; Frederick W. Taylor, Chemist; Frederick W. True, Librarian, Curator, Department of Mammals; Lester F. Ward, Honorary Curator, Department of Fossil Plants; Charles A. White, Curator, Department of Fossil Invertebrates; Henry C. Yarrow, Honorary Curator, Department of Reptiles; Stephen C. Brown, Registrar; Henry Horan, Superintendent of Buildings; Joseph Palmer, chief modeler; William T. Hornaday, chief taxidermist.

B. P.

SMITHSONIAN INSTITUTION.

UNITED STATES NATIONAL MUSEUM.

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No. 11.

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**A PROVISIONAL CLASSIFICATION OF THE FOOD COLLECTIONS.**

**By G. BROWN GOODE.**

This list of foods here presented is known to be imperfect, both as regards form and completeness. It was prepared to aid in the formation and preliminary arrangement of the food collections in the National Museum, and to serve as a check-list for use in gathering material for the Museum. It is not based upon structural characters or even upon modes of preparation, convenience only having been sought. It is intended to include only such articles of food as are used by European nations. Criticism is requested.

Since the completion of this classification the curatorship of the food collections has been assumed by Prof. J. Howard Gore.

SMITHSONIAN INSTITUTION, *October 1, 1881.*

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ANALYSIS.

FOOD SUBSTANCES.

SYNOPSIS.

- I.—MEATS. Fresh; Dried; Smoked; Pickled; Potted; Canned; In extract; Condensed. [Eggs and milk included.]
- II.—FRUITS AND VEGETABLES. Fresh; Dried; Pickled [in vinegar or salt]. Preserved in sugar—[jams, marmalades, jellies, conserves, candied]; Canned; Condensed; In extract.
- III.—NUTS AND NUT-LIKE PRODUCTS.
- IV.—SPICES, CONDIMENTS, AND FLAVORING MATERIALS. Fresh; Dried [ground]; Pickled; Conserved; In extract.
- V.—FARINACEOUS SUBSTANCES AND STARCHES. Cereals, pulse and starch tissues. Fresh; Dry; Crushed; Ground [meal, flour, bran]. Starch.
- VI.—SUGARS. Raw materials; Molasses and sirups; Melados; Crystallized sugars; Refined sugars [crushed, pulverized, &c.].
- VII.—BEVERAGES AND MATERIALS FOR BEVERAGES.
  - OF ANIMAL ORIGIN. Milk. Preparation of honey.
  - OF VEGETABLE ORIGIN. *Non-spirituos.* Infusions. Tea. Coffee. Cocoa, &c.
  - Spirituos.* Fermented.
    - Malt liquors.
    - Wines.
    - Distilled.
  - Vinegars.*
- OF MINERAL ORIGIN. *Spring waters.* Artificial water.
- VIII.—NARCOTICS.
- IX.—OILS AND FATS. Vegetable oils. Butter. Lard.
- X.—CHEESE.

## I.—MEATS.

## DOMESTICATED ANIMALS :

{	Beef.	Pickled.	Corned beef.
	Veal.		Corned tongues.

Dried or smoked.

Smoked beef.

Smoked tongue.

Beef hams.

Bologna sausage.

Dried beef.

Chipped beef.

Pemmican.

Canned.

"Roast beef."

"Beef à la mode."

Canned corned beef.

"Deviled tongue."

"Bouillon."

"Ox-tail soup."

Mock turtle soup.

Special preparations.

"Extract of beef."

"Meat juice."

"Extractum carnis."

Desiccated beef.

Gelatine.

Calves' foot jelly.

Rennet.

Pepsin and its preparations.

Preparations of the brain.

Pickled tongues.

"Roast mutton."

{	Mutton.	Canned.
	Lamb.	

Pork.	Pickled.
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Salt pork.

Corned hams and shoulders.

Dried or smoked.

Hams.

Bacon.

Sausage.

Canned.

Ham.

"Deviled ham."

"Potted ham."

"Potted sausage."

"Boneless ham."

# I.—MEATS.

## DOMESTICATED ANIMALS:

Horse.

{ Goat.  
{ Kid.

## GAME:

Venison.

Hare.

Rabbit.

Bear.

## POULTRY:

Fowl. Canned.

"Cocks' combs."

Capon.

"Chicken."

"Roast chicken."

Turkey. Canned.

"Roast turkey."

"Boneless turkey."

Goose. Canned.

"Pâté de Foie Gras."

Duck.

Pea-fowl.

Guinea fowl.

Pheasant.

GAME BIRDS. It is not thought necessary to specify these in this place.

FISH AND SHELL-FISH. Treated with the Fishery Collection.

Turtle soup, canned.

## EGGS:

Fowl.

Turkey.

Duck.

Goose.

Guinea fowl.

Plover.

Gull.

Murre (California).

Turtle.

Shad-roë.

Mullet-roë, "Botargo."

Axayacat = Insect eggs.—Mexico.

# II.—FRUITS AND VEGETABLES.

FRUITS.	Fresh.	Canned.	Conserved.	Dried.
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(Jams.)  
(Marmalades.)

Apples.

\*

\*

\*

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Jelly.

Butter.

## II.—FRUITS AND VEGETABLES

FRUITS.	Fresh.	Canned.	Conversed. Jelly.	Dried.
Apples, Crab.	*			
Apricots.	*	*	*	
Avocado pear.				
Bananas,	*			*
Barberries.				
Blackberries.	*	*	*	*
Cantaloupes.	<i>See</i> Muskmelons.			
Cherries.	*	*	*	*
“Birambi”.			* Pickled. (** desiccated).	
Citrons.			*	*
Cocoanuts. (Green.)*				**
Cranberries.	*		*	
Currants.	*	*	*	
“ Black.	*		(“Dried currants.” <i>See</i> Grapes.)	
Damsons. <i>See</i> Plums.				
Dates.				*
Elderberries.				
Figs.	*			*
Ginger root.			*	
Gooseberries.	*	*	*	
Grape-Fruit. <i>See</i> Shaddocks.				
Grapes.	*		* Raisins. “ Beshmet.” “ Currants.”	
Green gages. <i>See</i> Plums.				
Guavas.			*	
Huckleberries. <i>See</i> Whortleberries.				
Jujube.			*	
Lemons.	*		*	
Loquats, or Japanese plums.				
Limes.	*		(Pickled).	
Mandrake, or May-apple, fresh.				
Mulberries.	*			
Muskmelons.	*			
Nectarines.	*			
Olives.			(Pickled).	
Oranges.	*			
Pawpaws (American).*				
Peaches.	*	*	*	*
Peach-blossoms.			*	
Pears.	*	*	*	*
Persimmons.	*			



## II.—FRUITS AND VEGETABLES.

FRUITS.	Fresh.	Canned.	Conserved.	Dried.
Pine-apples.	*	*	*	
Plantains.	*			
Plums.	*	*	*	*
Beach-plums.				
Green gages.	*	*		
Damsons.	*	*		
Prunes.				
Prunellos.				*
Pomegranates.	*			
Pumpkins.	*			*
Prickly pears (cactus).*				
Quinces.	*		Jelly.	
Raspberries.	*	*	*	*
Rose-leaves.			*	
Strawberries.	*	*	*	
Service-berries.				
Shaddocks.	*			
Tamarinds.			*	
Tomatoes.	*	(Canned as	*	
“ Cherry, or	*	vegetables).		
“ Cape Gooseberries.”				
Watermelons.	*			
Whortleberries.	*			

### VEGETABLES:

#### Preliminary classification.

**A. Fruits and Nuts.**

**B. Pulse and Cereals.**

**C. Sprouts and Leaves.**

**D. Buds and Flowers.**

**E. Roots and Tubers.**

**F. Cryptogamic Plants.**

NOTE.—The group to which each vegetable belongs is indicated by one of the above letters.

	Fresh.	Canned.	Pickled.	Dried.
Achias v. Bamboo.				
Apples. (A).	*			
Artichokes. (D).	*			
Asparagus. (C).	*	*		
“ (French).		*		
Badderlocks. (C).				
Bamboo. (C).				
Beans. (B).	*	*		
Butter beans.	*	*		
Lima beans.	*	*		
Flageolets.	*	*		

## II.—FRUITS AND VEGETABLES.

## VEGETABLES:

Haricots=string-beans=snap-beans=bush-beans=kidney  
beans. \*

Horse-beans.

Lentils.

Beets. (E). \* \*

Beet-sprouts. \* (C).

Broccoli. (C).

Brussels sprouts. (C).

Bore-cole. *See* Kale.

Cabbage. (C). \* "Sauerkraut."

Cassava. (C). \*

Capers. (D). \*

Carrots. (E). \*

Cauliflower. (D). \*

{ Celery. (C).

{ Celeriat. (C).

Cardon. (C).

Chervil (*Cherophyllum bulbosum*). (C and E).

Cepes. \*

Chives. (E). \*

Corn (green). (B). \* \* \*

Corn salad. (C).

Cresses (C). *See* Water-cresses.

Cucumbers. (A). \*

Gherkins. \*

Cymbings. *See* Symblims and Squash.

Dandelion sprouts. \* (C).

Dulse. (C). \* \*

Egg-plant. (E). \*

Elder shoots (pickled to imitate bamboo).

Endive. (C). \*

Flageolets. *See* Beans.

Gherkins. *See* Cucumbers.

Gumbo. *See* Ochra.

Haricots. *See* Beans.

Hops. *See* Yeast.

Kale. (C).

Kohl Rabbi. (C). \*

Lamb-lettuce. *See* Corn-salad.

Laver. (C).

Jerusalem artichokes. (E). \*

Lettuce. (C). \*

Lentils. *See* Beans.

Mangold-wurzel. (E). \*

## II.—FRUITS AND VEGETABLES.

## VEGETABLES.

Martynia. (A).			*
Milkweed sprouts.	*	(C).	
Mushrooms. (F).	*		*
Mustard leaves. (C).			
Nasturtiums. (C, D).	*		*
Okra, or Ochra. (A).	*	*	*
Olives. (A).			*
Onions. (B).	*		*
Orache=Mountain spinach (C), fresh.			
Parsley. (C).			
Parsnips. (E).	*		
Pawpaw—Tropical (A), fresh.			
Peas (green). (B).	*		
French peas.		*	
Pepper-grass. (C).			
Peppers. (A).	*		*
Plantains. (A).	*		
Poke stalks. (C).	*		
Potatoes. (E).	*		
Sweet. (E).	*		
Yams.			
Chinese.	*		
Purslane or pusley. (C).			
Pumpkins. (A).	*		*
Radish-pods. (A).			*
Radishes. (E).	*		
Rape. (C).			
Rhubarb. (C).	*	*	
Ruta-baga. (E).	*		
Scorzonera. (E).			
Salsify. (E).	*		
Samphire. (C).			*
Sorrel. (C).	*		
Spinach. (C).	*		
Savoy Cabbage. See Cabbage.			
Scolymus=Spanish Oyster-plant (E), fresh.			
Squashes. (A).	*		*
Symblims.	*		
Sea kale. (C).			
Skirret ( <i>Sium sisarum</i> ) (E), fresh.			
Sprouts. (C).	*		
Symblims. See Squash.			
Tomatoes. (A).	*	*	*
			Catsup.

## II.—FRUITS AND VEGETABLES.

## VEGETABLES.

Tuckahoe. (F).	*		
Turnips. (E).	*		
Truffles. (F).		*	
Vegetable marrow (A), fresh.			
Vegetable oyster. See Salsify.			
Water-cresses.	*		
Walnuts.			*
Yams.	*		
			Catsup.
Mixed.			
Succotash.	*	*	
Chow-chow, }			*
Piccalilli, &c. }			

## III.—NUTS AND NUT-LIKE SUBSTANCES.

## Preliminary classification.

## A. True Nuts.

## B. Pits.

## C. Cone-seeds.

## D. Tubers.

Almonds, sweet. (B).	"Jordan."	Valentia."
" bitter. (B).		
Beech-nuts. (A).		
"Belotes." A. [Acorns of <i>Quercus gramuntta</i> and <i>Q. castagnara</i> ], eaten in Spain and Italy.		
Black walnuts. (A).		
Brazil nuts. (A).		
Butter-nuts. (A).		
Cashew-nuts.		
Chestnuts. (A).		
" American.		
" French.		
" Italian.		
Chinquapins. (A).		
Cocoanuts. (A).		
Filberts. See Hazel-nuts.		
Gouba peas. See Peanuts.		
Ground-nuts. See Peanuts.		
Hazel-nuts. (A).		
Filberts.		
Hickory-nuts. (A).		
Peanuts. (D).		
Pecans. (A).		
Pine-nuts, (Piñons). (C).		
Pistachio nuts. (B).		
Walnuts. (A).		

IV.—SPICES, CONDIMENTS, AND FLAVORING MATERIALS.

**Preliminary classification.**

**A. Berries and Fruits, and Seeds.**

**B. Buds.**

**C. Leaves.**

**D. Barks and Rinds.**

**E. Roots.**

**F. Minerals.**

**G. Gum.**

**H. "Fish."**

Allspice. (A).

Anchovies. (H.)

Almonds. (A). (Burnt).

Alum. (F).

Anatto. Coloring substance.

Angelica.

Anise seed. (A).

Asafœtida. (G).

Basil. (C).

Bicarbonate of Soda. (F). (Baking powder.)

Borage. (C).

Burnet.

Calamus root. (E).

Capers. (B).

Capsicum. (A). Cayenne pepper.

Caraway seeds. (A).

Cardamum seeds. (A).

Cassia buds. (B).

Celery seeds. (A). Celery salt.

Cassia bark, (D), or bastard cinnamon.

Cayenne pepper. *See* Chillies.

Chicory. (E).

Chillies. (A).

Chocolate. *See* Cocoa.

Cinnamon. (D).

Citron rind. (D).

Cloves. (B).

Cocoa. (A).

Coffee. (A).

Coriander seed. (A).

Cream of Tartar. (F). (Baking powder.)

Dill.

Fennel seeds. (A).

Garlic. (E).

Ginger. (E). Calcutta.  
African.



## IV.—SPICES, CONDIMENTS, AND FLAVORING MATERIALS.

**Preliminary classification.**

Horseradish. (E).  
 Leeks. (E).  
 Long pepper. (A).  
 Liquorice. (E).  
 Lemon rind. (D).  
 Mace. (D). *See* Nutmeg.  
 Mustard. (A).  
 Nasturtium seeds. (A).  
 Nutmegs. (A).  
 Onions. (B).  
 Orange rind. (D).  
 Pepper, white. (A).  
     "    black. (A).  
 Peppermint. (C).  
 Pimento. *See* Allspice.  
 Rocambole. (E).  
 Saffron. (Coloring material.)  
 Sage. (C).  
 Salt. (F).  
 Sarsaparilla. (E).  
 Shallot. (E).  
 Sassafras. (D).  
 Sodium bicarbonate v. Bicarb. soda.  
 Star Anise seeds. (A). "Curry powder."  
 Summer savory. (C).  
 Sweet marjoram. (C).  
 Tarragon. (C).  
 Tartaric acid. (Baking powder.)  
 Thyme. (C).  
 Turmeric. (E).  
 Vanilla. (A).  
 Wintergreen. (C). Checkerberry.  
 Yeast. (F). Compressed yeast, &c.

"Snails" ( <i>Medicago orbicularis</i> ).	{ Pods used for garnishing salads "to excite surprise or curiosity among the guests at a table."
"Caterpillars" ( <i>Spupiorus</i> sp).	
"Worms" ( <i>Astragalus hamosus</i> ).	

## MINERAL SUBSTANCES USED IN ADULTERATION.

Barytes.  
 Felspar.  
 Steatite.  
 Silix.

V.—FARINACEOUS AND STARCHY SUBSTANCES.

**Preliminary classification.**

**A. Cereals.**

**B. Nuts.**

**C. Pulse.**

**D. Leaves.**

**E. Roots.**

**F. Stem and Pith.**

Achira E. (Spec. of Canna).	Achira Starch.
Arrowroot (E).	Arrowroot starch.
Barley (A).	Pearl barley.
	Barley meal.
	Crushed barley.
	Barley flour.
Beans (C).	Dried beans.
	Split beans.
	Bean meal.
Buckwheat.	Buckwheat flour.
Birds'-nests.	
Carrigeen. <i>See</i> Irish moss.	
Carob, or St. John's bread. (C).	
Cassava. <i>See</i> Tapioca.	
Chestnut. (A).	Chestnut meal.
	"Apilada"= Dry and peeled chest nuts.
	Chestnut Starch.
Chick-pea. (C).	
Coontie. (F).	Coontie starch.
Corn (A).	Dry corn.
Sugar corn.	
Yellow corn.	Hulled corn, (prepared with lye).
White corn.	Hominy, or cracked corn.
Pop-corn, etc.	Grits.
	Samp, or fine hominy.
	Corn meal.
	Pop-corn flour, "Snow-flake."
	Corn-starch.
	Pop-corn.
	Corn bread of all kinds.
	Dry haricots.
Haricots. (C).	
Iceland moss.	
Irish moss. (D).	Irish moss.
	"Sea-moss farine."
Lentils. (C).	Dry lentils.
Millet. (A).	

## V.—FARINACEOUS AND STARCHY SUBSTANCES.

Oats. (A).	Dry oats.
	Oaten grits.
	Oatmeal. (Fine and coarse.)
	Oatmeal bread, crackers, etc.
Pease. (C).	Dry pease.
Plantain meal.	Split pease.
Portland Sago. (E).	Pea meal.
Potatoes. (E).	Potato starch.
	"Potato sago.
Rice.	"American." (A). "Paddy."
	"Arracan."
	"Akyab." Rice.
	"Bassein."
	"Bengal." Rice meal.
	"Brazil."
	"Ballam." Rice starch.
	"Java."
	"Madras."
	"Moulmain."
	"Patna."
	"Rangoon."
	"Sargon."
	"Siam."
Rye. (A).	Rye meal.
	Rye flour.
	Rye bran.
	Rye bread.
Sago. (F).	Sago starch.
Sorghum. (A).	Sorghum flour.
Tapioca. (E).	"Cassava."
	"Rio."
	"Bahia."
Tous le Mois (E).	"Mandioca."
Wheat. (A).	Tous le Mois starch.
	Pearl wheat.
	Wheat grits.
	Steam-cooked wheat grits.
	Meal. Flour.
	Bran. Middlings.
Pollard.	
Graham flour.	
New process flour.	
Whole wheat flour.	
Starch.	

V.—FARINACEOUS AND STARCHY SUBSTANCES.

"Corn starch."

Farina.

"Manioca."

Diabetic flour. (Bran.)

Dyspeptic flour. (Gluten.)

Infants' food.

"Imperial granum," etc.

"Ridges food."

Bread, leavened and unleavened.

Pastry.

Crackers. Milk. Butter.

Water. Soda.

Maccaroni and vermicelli.

VI.—SUGARS.

Cane sugar.

Muscovado.

Melado.

Molasses. "Porto Rico." "New Orleans."

"Santa Cruz."

Sirup. "Sugar-house," etc.

Brown sugar.

Loaf sugar. [Crushed, granulated, cubes, powdered.]

Confectioner's sugar. Barley sugar.

Rock candy. Caramels.

*Confectionery and candy of all kinds.*

Colorings for candy.

Corn sugar.

Sorghum sugar.

Beet sugar. Mangold-wurzel sugar.

Birch, poplar, oak and ash sugars.

"Jaggary," or palm sugar.

Date sugar.

Maple sugar. Sirup. Molasses.

Grape sugar. "Confectioners'." "Brewers'."

Glucose.

Honey.

Liquorice.

Sarcocoll.

VII.—BEVERAGES AND MATERIALS FOR BEVERAGES.

OF ANIMAL ORIGIN. Milk. Whey. Buttermilk. Koumiss. Preparations of honey. "Mead." "Metheglin." [Bouillons and soups.]

## VII.—BEVERAGES AND MATERIALS FOR BEVERAGES.

OF VEGETABLE ORIGIN.		Infusions and materials for infusions.	
Tea.	Green.	Imperial.	
		Gunpowder.	Ping Suey Gunpowder.
		Hyson.	Young Hyson.
		Twankay.	
		Japan.	
	Black.	Pekoe.	Orange-flower Pekoe.
			Flowery Pekoe.
			Pekoe.
			Broken Pekoe.
			Pekoe dust.
			Pekoe Souchong.
		"Caper."	
		Oolong.	
		Pouchong.	
		Souchong.	
		Congou.	
		Bohea.	

## American.

Leaves used in adulterating tea, or as substitutes:

- "Swiss tea."
- Arabian tea.
- "Bosjes or Boer tea."
- "Hottentot tea."
- Bencoolen tea.
- "Mountain tea."
- "Lime tea."
- "Labrador tea."
- "Kola tea."
- "Corossal tea."
- "Sumatra tea."

Maté, or Paraguay tea (*Ilex paraguayensis*).

Ynpon, or American tea (*Ilex cassini*).

Appalachian tea (leaves of *Viburnum cassinoides*).

Sweet fern.

Abyssinian tea (leaves of *Catha edulis*), used by Arabs.

Coffee.	Arabian.	"Mocha."	} African.
		"Bourbon."	
		"Cazengo."	
		"Aconge."	
		Liberian.	



VII.—BEVERAGES AND MATERIALS FOR BEVERAGES.

OF VEGETABLE ORIGIN.

East Indian. "Java." "Nilghery."

"Ceylon." "Mysore."

"Bombay."

"East Indian." "Madras."

"Singapore." "Cochin."

"Macassar."

American. "Laguayra." (Trillado and Des-  
zerado).

"Puerto Cabello."

"Maracaibo."

"Savanilla."

"Curaçao."

"Costa Rica."

"Guatemala."

"Nicaragua."

"Mexican."

"Ecuador."

"Porto Rico."

"Jamaica."

"Cuba."

"Santo Domingo."

"Rio."

"Bahia."

"Ceara."

"Peaberry."

"Bedagosa"—Brazilian substitute for coffee.

Chicory.

Amande de Terre.

Guarana bread.

Date-stone coffee—"Melilotine coffee."

Cocoa. Cocoa.

Cocoa shells. "Cocoa tea."

Chocolate.

"Broma."

JUICES OF FRUITS AND OTHER SUBSTANCES:

Angostura bitters.

Lime-juice.

Fruit sirups and vinegars.

Root beer. Sarsaparilla. Spruce beer.

SPIRITUOUS LIQUORS:

Malt liquors.

White beer.

Lager beer.

Bock beer.

## VII.—BEVERAGES AND MATERIALS FOR BEVERAGES.

## SPIRITUOUS LIQUORS.

*Malt liquors.*

Ale.      Bitter beer.  
 Stout.  
 Porter.  
 Yeast.      Hops.

*Wines.*

Rhine wines, &c.  
 Mosel wines, &c.  
 Austrian wines.  
 Hungarian wines.  
 Bordeaux wines.  
 Burgundy wines.  
 Champagnes.  
 Muscat wines.  
 Spanish wines.      Sherry.      Adelantadillo.  
    Malaga.  
 Portuguese wines. Port.  
    Madeira.  
 Italian wines.      Marsala, etc.  
 Greek wines.  
 American wines, &c.

*Fruit wines.*

Blackberry wine.  
 Currant wine.  
 Orange wine.  
 Aurantra wine—Sardinia and India.  
 Raspberry wine.  
 Elderberry wine.

*Cider.*

Crab-apple cider.      Pear cider.      Perry.  
 Birch wine.  
 "Toddy."

*Distilled liquors.*

Alcohol.  
 Whisky.      Corn whisky.      Pulque, Mexican agave liquor.  
    Rye whisky.  
    Potato whisky.  
    "Hoochenoo."  
 Rum.  
 Brandy.      Cognac.  
 Arrack ("Toddy").  
 Gin.  
 Apple-jack.

# VII.—BEVERAGES AND MATERIALS FOR BEVERAGES.

## SPIRITUOUS LIQUORS.

### Liqueurs and cordials.

Maraschino.	Anisette.
Curaçao.	Chartreuse.
Rosoglio.	
Aquavita.	
Absinthe.	
Angostura.	

### Vinegar.

Cider vinegar.	
Wine vinegar.	
	Tarragon vinegar.
Sulphuric acid vinegar.	
Acetic acid vinegar.	

## MINERAL BEVERAGES (Natural and artificial):

Sulphur waters.	
Aerated waters.	Soda water. Ginger beer.
Iron waters (Chalybeate).	
Cathartic waters.	
Lithia water.	

# VIII.—NARCOTICS AND MASTICATORIES.

Opium.

Chloral.

Tobacco.	Leaves.
	Fine-cut.
	Powdered.
	Plug tobacco.
	Snuff.
	Cigars.
	Cigarettes.

Tobacco to be shown by localities.

“Asarabacca”—a Cephalic snuff.

Hascheesch. Hyoscyamus.

Coca—“Acuelico.”

Betel nuts and betel leaves, used with shell lime.

“Akarakarum”—India.

Chewing-gums.

# IX.—OILS AND FATS.

Olive oil.

Cotton-seed oil.

Butter.

Lard.

Oleomargarine.

## IX.—OILS AND FATS.

Beech-nut oil, used in France as a substitute for butter.

Cocoa-butter.

Turtle oil.

## X.—CHEESE.

American.

"Parmesan." "Strachino."

"Stilton."

"Cheshire."

"Edam." "Rahmkase." "Texelkase."

"Gruyere." "Schweitzer," or Swiss. "Krauterkase."

"Neufchatel." Cream cheese. "Sage cheese."

"Pine-apple."

"Fromage de Brie."

"Gouda."

"Leyden."

"Limburger."

"Muenstar."

"Roquefort."

"Cheddar."

"Menauta"="Camembert," canned.

"Cottage cheese"="Schmierkase."

"Pot-cheese."

Rennet. Liquid rennet. Pepsin.

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Boneless, canned.....	3	Grits.....	12
Roast.....	3	Whey.....	14
Turnips.....	8	Whisky.....	16
Turtle.....	3	Corn.....	16
Oil.....	18	Hoochenoo.....	16
Vanilla.....	10	Potato.....	16
Veal.....	2	Rye.....	16
Vegetables.....	6, 7, 8	Whortleberries.....	5
Vegetable oysters.....	8	Wines.....	16
Venison.....	3	Wintergreen.....	10
Vermicelli.....	13	Yams.....	8
Vinegars.....	17	Yeast.....	10, 16
Acetic acid.....	17	Compressed.....	10

SMITHSONIAN INSTITUTION.

UNITED STATES NATIONAL MUSEUM.

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No. 12.

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**CLASSIFICATION OF THE COLLECTION TO ILLUSTRATE THE  
ART OF TAXIDERMISTRY. (58, B. 1)\***

**By WILLIAM T. HORNADAY.**

**TOOLS, MATERIALS, AND ACCESSORIES.**

**A. Tools used by taxidermists.**

- (1) For skinning animals.
- (2) For cleaning skins.
- (3) For carving wooden skulls, bones, etc.
- (4) For drilling and boring.
- (5) In building manikins.
- (6) For inserting fibrous filling-materials.
- (7) In setting eyes and modeling generally.

**B. Materials used.**

- (1) Preservatives and protectives for skins.
- (2) Iron supports.
- (3) Fibrous filling-materials.
- (4) Plastic filling-materials.
- (5) Materials for repairing and restoring.
- (6) Specimens of repairing work.
- (7) Coloring-materials and appliances.
- (8) Materials for removing grease, dirt, and blood from feathers and hair.

**C. Accessories.**

- (1) Glass eyes.
- (2) Artificial leaves.
- (3) Artificial ground-work: water, ice, snow, rock, and wood.
- (4) Artificial perches, trees, and pedestals.

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\* Division VIII. Intellectual Occupations of Mankind.  
Class 58. The Graphic, Plastic, and Decorative Arts.  
Section B. Taxidermy, and animal modeling.  
Subsection 1. Taxidermy.

## PROCESSES IN TAXIDERMY.

## D. Dry skins of animals not mounted.

- (1) Mammals.
- (2) Birds.
- (3) Reptiles.
- (4) Fishes.

## E. Models to show the processes of relaxing dry skins.

## F. Sets of models illustrating the processes of mounting.

- (1) Small mammals.
- (2) Large mammals.
- (3) Small birds.
- (4) Large birds.
- (5) Serpents.
- (6) Fishes, entire and in medallion.
- (7) Heads of mammals.

## EXAMPLES OF TAXIDERMIC WORKMANSHIP.

## G. Mammals, small, medium, and large.

## H. Birds, small, medium, and large.

## I. Reptiles, small, medium, and large.

## J. Fishes, small, medium, and large.

## K. Artistic groups of the above, in variety.

## L. Grotesque groups, in variety.

## M. Animals grotesquely mounted.

## N. Ornamental or decorative taxidermy.

- (1) Heads on shields and in cases.
- (2) Screens (with head and neck of bird, or entire subject).
- (3) Medallions, large and small.
- (4) Panel-pieces on shields and in cases.
- (5) Rugs, with head mounted.
- (6) Hat-birds and birds' heads.
- (7) Other ornamental or decorative work.

## O. Photographs of first-class work of all kinds, by representative taxidermists.



SMITHSONIAN INSTITUTION.

UNITED STATES NATIONAL MUSEUM.

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No. 13.

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OUTLINE OF A SCHEME OF MUSEUM CLASSIFICATION.

By G. BROWN GOODE.

WASHINGTON, April 10, 1882.

Sir: I submit herewith the outline of a plan of classification for use in the arrangement of specimens and other materials in this Museum. Should the form of this outline stand the test of criticism, I purpose at an early date to submit a more detailed scheme of classification, sufficiently minute in its subdivisions to be made useful in the assorting and distribution of the immense quantities of objects now stored in the Museum buildings.

In explanation of the wide scope of this effort, I have only to remark that it has been my ambition to frame a classification so broad that a place shall be provided for every object which has a name, so that should the limits of our work, in future, be extended in any direction whatever, this may be done in accordance with a uniform plan.

I think I may safely say that the Museum has already in its possession considerable collections in every class named in the schedule, particularly among the materials obtained from the aborigines of America.

I am, sir, yours respectfully,

G. BROWN GOODE.

Professor SPENCER F. BAIRD,

*Director United States National Museum.*

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OUTLINE OF A SCHEME OF MUSEUM CLASSIFICATION.

ANALYSIS.

Divisions.	Classes.
I. Mankind .....	1- 3
II. The Earth as Man's Abode .....	4-10
III. Natural Resources .....	11-15
IV. The Exploitative Industries .....	16-20
V. The Elaborative Industries .....	21-38
VI. Ultimate Products and their Utilization .....	39-47
VII. Social Relations of Mankind .....	48-54
VIII. Intellectual Occupations of Mankind .....	55-64

## OUTLINE.

## I.—MANKIND.

## ANTHROPOLOGY.

1. Man as a zoological unit.....Somatology and psychology.
2. Man, grouped in peoples or races. (*a*) Races of men, physical characters; (*b*) linguistic characters; (*c*) art and industrial characters; (*d*) ethnogeny; (*e*) geographical distribution of races; (*f*) history, prehistoric and recent, etc.
3. Man, in individual manifestations. Representative men: Biography.

## II.—THE EARTH AS MAN'S ABODE. HEXIOLOGY.

4. The earth, in the solar system ..Cosmology.
5. The earth's structure .....Geology.
6. The features of the earth's surface. Physiography.
7. The atmosphere and its phenomena. Meteorology.
8. Effects of man upon the earth's surface, and of climate, physical features, &c., on man. Man and nature.
9. Apportionment and nomenclature of the earth's surface. Geography.
10. Exploration of the earth.....Voyages and travels.

## III.—NATURAL RESOURCES.

## FORCE AND MATTER.

11. Force in its manifestations .....Physics, mechanics, and physiology.
12. The elements and their combinations. Chemical collections.
13. Inorganic matter .....Mineralogical collections.
14. The vegetable kingdom .....Botanical collections.
15. The animal kingdom .....Zoological collections.

## IV.—THE EXPLOITATIVE INDUSTRIES. EXPLOITATIVE TECHNOLOGY.

*Primary.*

16. Exploitation of inorganic materials. Mining and quarrying.

17. Exploitation of vegetable products of spontaneous growth. Lumbering and field-gleaning.
18. Capture of animals ..... Hunting, fishing, &c.  
*Secondary.*
19. Culture of plants ..... Agriculture, horticulture and forestry.
20. Culture of animals: domestic animals and their uses. Pecudiculture.

V.—THE ELABORATIVE INDUSTRIES.—ELABORATIVE TECHNOLOGY.

21. Preparation of food-stuffs, narcotics, &c.
22. Distillation, manufacture of perfumeries, &c.
23. Oils, fats, soaps, and waxes; their preparation and use.
24. Gums, resins, glues, and cements.
25. Pigments and dyes; painting, staining, polishing, bleaching, &c.
26. The chemical manufactures and their products.
27. Feathers, hair, bristles, and their use.
28. Furs and leathers; tanning and currying.
29. Fibers, cordage, textile fabrics, needlework, basket-work.
30. Paper and its manufacture; book-making; stationery.
31. Hard and flexible organic tissues and their use.
32. Woods, and the wood-working industries.
33. Stones, and the stone-working industries; masonry.
34. Metals, metallurgy, and the metal industries.
35. Glass and enamel and their fabrication.
36. Pottery, and the ceramic industry.
37. Tools, machinery, and motors, their manufacture and use.
38. Construction, architecture, and civil engineering.

VI.—ULTIMATE PRODUCTS AND THEIR UTILIZATION.

39. Foods and drinks: preparation, cookery, &c.
40. Narcotics and masticatories; pipes, &c.
41. Dress, and personal adornment.
42. Buildings, villages, and cities.
43. Furniture, house interiors, domestic economy, &c.
44. Heating and illumination.
45. Medicine, surgery, pharmacology, hygiene, &c.
46. Public comfort, recreation, protection and rescue.
47. Transportation by land and water: appliances and accessories.

VII.—SOCIAL RELATIONS OF MANKIND. SOCIOLOGY AND ITS ACCESSORIES.

48. The vocations of men.
49. Communication of ideas and their record: writing and printing, telegraphy, signals, &c.

- 50. Trade and commerce.
- 51. Societies and federations, social, beneficial, religious, and political.
- 52. Government and law.
- 53. War (including armor and weapons).
- 54. Festivals, ceremonies, usages, memorials, &c.

VIII.—INTELLECTUAL OCCUPATIONS OF MANKIND. ART, SCIENCE,  
AND PHILOSOPHY.

- 55. Games and amusements.
- 56. Music and musical instruments.
- 57. The drama and the stage.
- 58. The pictorial, plastic, and decorative arts.
- 59. Literature (from the intellectual standpoint only).
- 60. Folk lore, traditions, and superstitions.
- 61. Science: (Research and record.) Scientific instruments.
- 62. Philosophy, religious, metaphysical, and cosmical.
- 63. Education and reform; schools, museums, libraries, &c.
- 64. Climaxes of human achievement.

[Proceedings United States National Museum, 1881, Appendix.]

SMITHSONIAN INSTITUTION.

UNITED STATES NATIONAL MUSEUM.

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No. 14.

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**CIRCULAR REQUESTING MATERIAL FOR THE LIBRARY.**

The Smithsonian Institution solicits for the library of the United States National Museum, under its charge, copies of publications relating to all departments of anthropology, art, technology, zoology, botany, geology, mineralogy and lithology, geography and explorations, the reports and catalogues of societies, museums, and zoological gardens, as well as copies of plans and labels and other accessories of work in museums, and the catalogues of colleges and schools containing reference to courses of instruction or collections in natural history.

Authors' editions, or "separates" of communications published in periodicals, or proceedings of societies, are especially desired; and it is hoped that authors will furnish, as far as possible, sets of their publications complete to date.

The Smithsonian Institution offers in exchange an equivalent in copies of the proceedings and bulletins of the National Museum, a catalogue of which, complete to date, accompanies this circular; also such of its reports and other publications as can be supplied at the time of application.

The Smithsonian Institution is pleased to receive from investigators in special departments, and from public museums and institutions of learning, applications for such specimens of natural history as are found in North America.

SPENCER F. BAIRD,  
*Secretary of Smithsonian Institution and*  
*Director U. S. National Museum.*

CITY OF WASHINGTON, UNITED STATES OF AMERICA,  
*April 15, 1882.*



Packages of small size may be sent by express, charges to be collected on delivery, and larger packages by freight.

Packages may also be sent from points in the vicinity of military posts by addressing them to "*U. S. National Museum, care of Depot Quartermaster* (stating name of post)," the quartermaster having instructions to forward all such packages.

On the Pacific slope, packages may also be sent in care of the Alaska Commercial Company, San Francisco.

Foreign packages intended for the Museum may be sent by mail, addressed to the Smithsonian Institution, Washington, D. C., or, if of large size, through the following agents of the Smithsonian Institution:

Algeria: Commission Française des Échanges Internationaux, Paris.	Java: Genootschap van Kunsten en Wetenschappen, Batavia.
Australia: See New South Wales, New Zealand, Queensland, South Australia, Tasmania, and Victoria.	Mauritius: William Wesley, London.
Austro-Hungary: Dr. Felix Flügel, 49 Sidonien Strasse, Leipzig.	Mexico: Museo Nacional, Mexico.
Belgium: Commission Belge d'Échange Internationaux, Brussels.	Netherlands: Bureau Scientifique, Professor von Baumhauer, Harlem.
Brazil: Instituto Historico, Geographico y Ethnographico, Rio Janeiro.	New South Wales: Royal Society of New South Wales, Sydney.
Chile: Universidad, Santiago.	New Zealand: Parliamentary Library, Wellington.
China: U. S. Consul-General, Shanghai.	Norway: Kongelige Norske Frederiks Universitet, Christiania.
Cuba: Prof. F. Poey (R. University), Calle San Nicolas 96, Havana.	Portugal: Escola Polytechnica, Lisbon.
Denmark: Kongelige Danske Videnskabsbernes Selskab, Copenhagen.	Queensland: Government Meteorological Observatory, Brisbane.
France: Commission Française des Échanges Internationaux, Paris, or Leopold Bassange, Rue.	Russia: Commission Russe des Échanges Internationaux, St. Petersburg.
Germany: Dr. Felix Flügel, 49 Sidonien Strasse, Leipzig.	South Australia: Astronomical Observatory, Adelaide.
Great Britain: William Wesley, 28 Essex street, Strand, London.	Spain: Real Academia de Ciencias, Madrid.
Greece: By mail direct.	Sweden: Kongliga Svenska Vetenskaps Akademien, Stockholm.
Hayti: Secrétaire de l'Etat des Relations Extérieures, Port-au-Prince.	Switzerland: Bundes Canzlei, Berne.
Holland: See Netherlands.	Syria: By mail direct.
India: William Wesley, London.	Tasmania: Royal Society of Tasmania, Hobarton.
Italy: Biblioteca Nazionale Vittorio Emanuele, Rome.	Turkey: By mail direct.
	Venezuela: Universidad [Dr. A. Ernst], Caracas.
	Victoria: Public Library, Melbourne.
	West Indies: By mail direct.

If sent from seaport towns by vessel to New York, packages may be directed to Smithsonian Institution, care of Collector of Customs, port of New York.

## INSTITUTION SMITHSONIENNE. MUSÉE NATIONAL DES ETATS-UNIS.

L'Institution Smithsonian désire avoir en sa possession pour la Bibliothèque du Musée National des Etats-Unis, placée sous sa direction, des copies de publications relatives à tous les départements anthropologie, art, technologie, zoologie, botanique, géologie, minéralogie et lithologie, géographie et explorations; des rapports et catalogues de sociétés, musées et jardins zoologiques; comme aussi des plans, étiquettes et autres accessoires dont on se sert dans les musées; enfin, les catalogues de collèges et d'écoles, contenant les programmes des cours relatifs à l'enseignement des sciences naturelles ou aux collections qui s'y rapportent.

Des tirages séparés de publications dans des ouvrages périodiques ou des procès-verbaux de sociétés sont particulièrement désirables; et il est à espérer que, autant que la chose est possible, les auteurs présenteront des séries de leurs publications au complet.

En échange ou comme équivalent, l'Institution Smithsonian offre des copies des procès-verbaux et bulletins du Musée National, dont un catalogue complet jusqu'à cette date accompagne cette circulaire; de même que ceux de ses rapports et autres publications qui pourront être fournies à l'époque de la demande.

L'Institution Smithsonian recevra de la part d'investigateurs dans les départements spéciaux, de musées et d'institutions scientifiques, les demandes qu'ils pourront avoir à lui adresser afin d'obtenir des specimens d'histoire naturelle qui se trouvent dans l'Amérique du Nord.

SPENCER F. BAIRD,

*Secrétaire de l'Institution Smithsonian et*

*Directeur du Musée National des Etats-Unis.*

WASHINGTON, DISTRICT DE COLOMBIE,

ETATS-UNIS D'AMÉRIQUE,

15 Avril, 1882.



SMITHSONIAN INSTITUTION.

UNITED STATES NATIONAL MUSEUM.

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No. 15.

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THE ORGANIZATION AND OBJECTS OF THE NATIONAL MUSEUM.

I.

FOUNDATION AND LEGAL STATUS. THE NATIONAL MUSEUM was organized in 1846 by the act of Congress transferring to the SMITHSONIAN INSTITUTION the custody of the "National Cabinet of Curiosities," at that time deposited in the Patent-Office Building.\* These collections were, in 1857, placed in the Smithsonian building, the Regents of the Institution having accepted the trust on condition that the necessary appropriations for their maintenance should be continued by Congress.

The act above referred to provides that "all objects of art and of foreign and curious research, and all objects of natural history, plants, and geological and mineralogical specimens belonging or hereafter to belong to the United States, which may be in the city of Washington," shall be delivered to the Regents of the Smithsonian Institution, and, together with new specimens obtained by exchange, donation, or otherwise, shall be so arranged and classified as best to facilitate their examination and study.†

The National Museum is the authorized place of deposit for all objects of natural history, mineralogy, geology, archaeology, ethnology, &c., belonging to the United States or collected by the Coast and Interior Survey, the Geological Survey, or by any other parties for the Government of the United States, when no longer needed for investigations in progress.‡

II.

ORGANIZATION AND GOVERNMENT. The establishment of the Smithsonian Institution, to which, in addition to the carrying out of the other requirements of the bequest of Smithson, is intrusted the control of the National Museum, is composed of the President of the United States and his Cabinet, the Commissioner of Patents, and a BOARD OF REGENTS, which has for its members the Vice-President and Chief Justice of the United States,

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\*AN ACT to establish the "Smithsonian Institution" for the increase and diffusion of useful knowledge among men. (Approved August 10, 1846; Revised Statutes, title lxxiii, sections 5579-5594.)

† Revised Statutes, section 5586.

‡ Statutes Forty-fifth Congress, third session, chap. 182, p. 394.

three members of the Senate, three members of the House of Representatives, and six other persons, not members of Congress, two of whom are residents of the city of Washington.‡

The management of the National Museum is intrusted to the Secretary of the Smithsonian Institution, who is, *ex-officio*, its director. He is aided by a staff of assistants, who are chosen by him, and for whose action he is responsible to the Regents.

This staff is at the present time composed of an assistant director, six curators, six honorary curators, serving without pay, a number of assistants and aids, acting in various capacities, a registrar, chief taxidermist and chief modeler, besides a considerable force of preparators, mechanics, watchmen, clerks, laborers, &c.

The staff is constantly changing with the varying needs of the Museum.

The operations of the Museum are carried on by means of an appropriation annually made by Congress "for the care and preservation of the collections."

The collections are stored and exhibited in the building erected for the use of the Smithsonian Institution between 1847 and 1857, and in the new building, just finished, known as the "National Museum."

### III.

COMPOSITION OF THE COLLECTIONS. The Museum is made up, in large part, of the following materials :

1. The natural-history and anthropological collections accumulated since 1850 by the efforts of the officers and correspondents of the Smithsonian Institution.

2. The collections of the Wilkes Exploring Expedition, the Perry Expedition to Japan, and other naval expeditions.

3. The collections of the scientific officers of the Pacific Railroad Survey, the Mexican Boundary Survey, and of the surveys carried on by the Engineer Corps of the Army.

4. The collections of the United States Geological Surveys under the direction of the United States Geologists Hayden, King, and Powell.

5. The collections of the United States Fish Commission.

6. The gifts by foreign governments to the Museum or to the President and other public officers of the United States, who are forbidden by law to receive them personally.

7. The collections made by the United States to illustrate the animal and mineral resources, the fisheries, and the ethnology of the native races of the country, on the occasion of the International Exhibition at Philadelphia in 1876, and the fishery collections displayed by the United States in the International Fishery Exhibition at Berlin in 1880.

8. The collections given by the governments of the several foreign nations, thirty in number, which participated in the exhibition at Philadelphia.

\* Revised Statutes, 5580.



9. The industrial collections given by numerous manufacturing and commercial houses of Europe and America, at the time of the Philadelphia Exhibition and subsequently.

10. The material received, in exchange for duplicate specimens, from the museums of Europe, Asia, and Australasia, and from numerous institutions and collectors in North and South America.

#### IV.

ADJUNCTS TO ADMINISTRATION. As necessary adjuncts to the work of the Museum, a working library, a chemical laboratory, a photographic establishment, a workshop for taxidermy, modeling, and the preparation of skeletons, and several smaller workshops are carried on as a part of the general work of administration.

#### V.

PUBLICATIONS OF THE MUSEUM. The scientific results of the labors of the officers of the Museum, and of investigations upon the collections belonging to it, are to be found for the most part in the following works:

*Bulletin of the United States National Museum;*

*Proceedings of the United States National Museum;*

*Reports of the Smithsonian Institution;*

*Smithsonian Miscellaneous Collections;*

*Smithsonian Contributions to Knowledge;*

*Reports of the Bureau of Ethnology of the Smithsonian Institution;*

*Reports of the United States Commissioner of Fisheries;*

*Bulletin of the United States Fish Commission;*

also occasionally in other scientific reports of other scientific departments of the government.

#### VI.

OBJECTS AND METHODS OF WORK. The collections in the National Museum are intended to exhibit the natural and industrial resources, primarily of the United States, and secondarily of those of the remainder of the world, for purposes of comparison.

The activity of the Museum is exerted in three directions:

(a) The permanent preservation of objects already in its possession.

(b) The acquisition of new material.

(c) The utilization of material already in its possession, by its exhibition in the most instructive manner, and by the prosecution of and publication of scientific researches for which it forms the basis; by the distribution of properly-labeled duplicates of materials to colleges and other educational institutions.

The preservation of material is accomplished by means of the vigilance of the curators and the skill of the preparators.

New material is acquired (a) in accordance with law, from the various government surveys and expeditions; (b) by gift from individuals, from

other institutions, and from foreign governments; (c) by exchange for its duplicate specimens or publications; (d) by the efforts of officers of the Museum, who make collections in connection with their regular duties, or are detailed for special service of this nature; (e) by purchase when appropriations are made by Congress for that purpose.

The treasures in the custody of the Museum are utilized to the world by exhibiting them to the public, and by encouraging investigations on the part of the officers of the Museum and other suitable persons, and facilitating the publication of the results; also by the distribution to other museums and educational institutions of duplicate specimens, which have formed the basis of scientific investigation, these being identified and labeled by the best authorities.

## VII.

The Museum by these means fulfills a threefold function:

1. It is a *Museum of Record*, in which are preserved the material foundations of an enormous amount of scientific knowledge—the types of numerous past investigations. This is especially the case with those materials which have served as a foundation for the reports upon the resources of the United States. Types of investigations made outside of the Museum are also incorporated.

2. It is a *Museum of Research*, by reason of the policy which aims to make its contents serve as fully as possible as a stimulus to and a foundation for the studies of scientific investigators. Research is necessary in order to identify and group the objects in the most philosophical and instructive relations. Its officers are selected for their ability as investigators, as well as for their trustworthiness and abilities as custodians, and its treasures are open to the use of any honest student.

3. It is an *Educational Museum* of the broadest type, by reason of its policy of illustrating by specimens every kind of natural object and every manifestation of human thought and activity, by displaying descriptive labels adapted to the popular mind, and by its policy of distributing its publications and its named series of duplicates.

SMITHSONIAN INSTITUTION.

UNITED STATES NATIONAL MUSEUM.

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No. 16.

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**PLANS FOR THE INSTALLATION OF COLLECTIONS.**

The collections in the National Museum are now being assorted and rearranged, for the purpose of placing on exhibition a selected series of objects which shall be of interest to visitors, and of making the remainder serviceable for purposes of scientific and technological investigation. A large portion of the most interesting material has never yet been exhibited on account of lack of space.

The following general principles have been adopted in this work :

1. No object will be placed on exhibition which is not of evident educational value, and likely to interest and instruct a considerable percentage of the persons visiting the Museum.

2. The exhibition of duplicate material is to be avoided, except in instances where similar objects can be shown to advantage in different divisions of the Museum.

3. Each object will be placed in a case of the form best suited for its effective display, and the light, color of the background, &c., will be so adjusted as to show it to best possible advantage, and with the least possible fatigue to the eyes of the visitor.

4. Each object, or group of objects, will be accompanied by a large plainly printed label, which will give a concise description of what is shown, an account of its origin and uses, a synopsis of its history, and the name of the person or organization contributing it to the Museum. The character of the Museum is such that any labels which might suggest advertising for business purposes must be excluded. It will be the policy of the Museum, however, to give prominence on each label to the name of the person or business house from whom it has been received, provided that the object is a gift to the Museum.

5. The objects will be grouped together in systematic order, and each case will be provided with a general descriptive label. In the case of collective exhibits, the general label may also give the name of the contributor.

6. The specimens will be illustrated and supplemented by pictures, diagrams, books, and maps, in such manner that the Museum may form an encyclopedia, the illustrations for which are in the exhibition cases, the text in the labels.

7. Guide-book manuals of the different departments will be published, which will embody in concise and systematic form the information given by the specimen labels, together with such illustrative material as may seem necessary to present in addition.

SMITHSONIAN INSTITUTION.

UNITED STATES NATIONAL MUSEUM.

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No. 17.

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**CONTRIBUTIONS AND THEIR ACKNOWLEDGMENT.**

No money having at any time been specially appropriated for increasing the collections by purchase, the growth of the Museum has ever been and still is dependent solely upon the exertions of its officers and those of other branches of the public service and upon the public spirit and liberality of its friends.

The friends of the Smithsonian Institution and the National Museum are earnestly invited to take part in the work of building up the collections and in particular to respond to special requests for advice or other aid which may reach them by letter.

The following rules for the acknowledgment of specimens will be adhered to:

1. Each contribution will be recognized by a formal written acknowledgment from the Director.

2. Each contribution will be published in the annual reports of the Smithsonian Institution and the National Museum; and in the catalogues and other publications of these establishments in which the objects contributed may be alluded to, the name of the contributor will always be given.

3. On the label, which is invariably attached to every object, the name of the contributor will be conspicuously printed. In the case of donations the form will be "Gift of ————," and where the objects have been obtained by special exertions of a friend of the Museum, who, however, is not their donor, the form will be "Obtained by ————," or "Collected by ————."

4. Objects which may have been bought by special appropriations, such as those for the Philadelphia and Berlin exhibitions, will not be labeled with the name of the persons from whom purchased, except by special agreement in cases where these persons have been only in part paid for their exertions.

5. The Museum will make every possible return for aid rendered, by offering in exchange its publications and its duplicate specimens.





SMITHSONIAN INSTITUTION.  
UNITED STATES NATIONAL MUSEUM.

No. 18.

LIST OF PUBLICATIONS OF THE UNITED STATES NATIONAL  
MUSEUM.

A.—BULLETINS IN SEPARATE FORM.

*Bulletin 1.*—Check-List of North American Batrachia and Reptilia; with a systematic list of the Higher Groups, and an Essay on Geographical Distribution based on the specimens contained in the United States National Museum. By Edward D. Cope. 1875. 8vo, pp. 4, 104. (1)

*Bulletin 2.*—Contributions to the Natural History of Kerguelen Island, made in connection with the American Transit of Venus Expedition, 1874-'75. By J. H. Kidder, M. D., Passed Assistant Surgeon, United States Navy. I. Ornithology. Edited by Dr. Elliott Coues, United States Army. 1876. 8vo, pp. ix, 1, 51. (2)

*Bulletin 3.*—Contributions to the Natural History of Kerguelen Island, made in connection with the American Transit of Venus Expedition, 1874-'75. By J. H. Kidder, M. D., Passed Assistant Surgeon, United States Navy. II. 1876. 8vo, pp. 2, 122. (3)

CONTENTS.

Oology.—By J. H. Kidder and Elliott Coues.

Botany:

A. Phænogamia, Filices, et Lycopodiaceæ.

Revised by Asa Gray.

B. Musci. By Thomas P. James.

C. Lichenes. By Edward Tuckerman.

Algæ. By W. G. Farlow.

Crozet Flora.

Geology. By F. M. Endlich.

Mammals. By J. H. Kidder.

Fish. By Theodore N. Gill.

Mollusks. By W. H. Dall.

Insects:

Diptera. By C. C. Osten Sacken.

Pseudo-Neuroptera. By H. A. Hagen.

Crustaceans. By S. I. Smith.

Annelids, Echinoderms, and Anthozoa. By A. E. Verrill.

Surgeon E. Kershner's collection.

A Study of Chionis minor. By J. H. Kidder and Elliott Coues.

*Bulletin 4.*—Birds of Southwestern Mexico. Collected by Francis E. Sumichrast for the United States National Museum. Prepared by George N. Lawrence. 1875. 8vo, pp. 56. (4)

*Bulletin 5.*—Catalogue of the Fishes of the Bermudas. Based chiefly upon the collections of the United States National Museum. By G. Brown Goode, Curator United States National Museum. 1876. 8vo, pp. 2, 2 unnumbered, 3-82. (5)

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